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United States Department of Agriculture (USDA)
International Operational Agriculture Monitoring Program

USDA Foreign Agricultural Service

Iraq: Crop Progress Report

MY 2010/11

November/ Start of Season Summary

December 3rd, 2009

(1) Iraq has experienced severe drought and reduced irrigation supplies over the past two winter grain growing seasons (Marketing Years 2008/09 and 2009/10). This has resulted in severe declines in staple foodgrain (wheat) and feedgrain (barley) production, as well as higher than normal grain imports to prevent widespread food insecurity. Drought caused wheat production to fall 45 percent below normal in MY 2008/09 and 43 percent below normal in MY 2009/10. Wheat and barley are the primary grains grown in the country and normally account for 87 percent of Iraq's total annual grain production. The fate of the annual winter grain harvest, therefore, directly determines the food security situation in the country. The new MY 2010/11 winter grain planting season has been underway for a few weeks, and normally comes to a close in mid-to-late December.

(2) The current outlook for national winter grain production is uncertain at this early stage, and will be dependent on beneficial rainfall and improved water distributions from Turkey along the Tigris and Euphrates rivers. The bulk of the nations irrigation supplies are derived from these river systems, which are in turn dependent on both rainfall and adequate distributions or releases from Turkish reservoirs in the watersheds headlands. As will be discussed later, water levels in most of eastern Turkey's reservoirs are near normal, which indicates that they are capable of supplying adequate water for Iraq in the short term.

(3) In a normal year, wheat production in Iraq is fairly evenly divided between the predominantly rainfed northern governorates and the primarily irrigated southern governorates (Figure 1). The majority of barley production, on the other hand, occurs in the rainfed northern governorates (Figure 2). According to the Iraq crop calendar (Figure 3), harvesting of summer crops (corn, millet, sorghum, and rice) should have been completed by now, while sowing of winter wheat and barley will largely be complete by mid-December. Rainfed grain crops have a longer planting window than irrigated crops, which can extend into January when unfavorable moisture conditions occur. However the optimum planting window closes in December, and crops sown after this period usually suffer significant yield declines. For the vast acreages of rainfed grains in northern Iraq, the arrival of sufficient autumn rainfall is generally the determinant of when the crops will be sown. Typically, Iraq's winter grains emerge in the early winter months and reach peak growth stages in the February to April period (Figure 4).

(4) Satellite vegetation index data (NDVI), which illustrates seasonal growth and development of grain crops, has been well-below normal as a result of drought in many areas of Iraq during the past two growing seasons (Figures 5, 6). This data is related to crop yield prospects, and

clearly shows the result of the recent two year drought in Iraq. While most of northern Iraq's agriculture is rainfed, a minority of agricultural land in that region receives some irrigation (as reported by the UN Food and Agriculture Organization - FAO). Its sources are springs, streams, and wells [1]. Southern Iraqi crops are primarily irrigated due to the fact that they are located in areas which normally receive inadequate seasonal rainfall (Figure 7). The southern Iraqi croplands are very flat and just above sea level. Most irrigation occurs via canals or ditches, which can become overgrown with weeds or other vegetation. Owing to generally poor irrigation infrastructure maintenance and improper water usage, soil salinization and sub-optimum crop yields are common. These problems could be compounded by decreasing river levels stemming from insufficient cross-border releases from rivers and reservoirs in neighboring Turkey, Syria, and Iran. The two-year decline in regional NDVI values corresponds with the decrease in rainfall and the decline in crop vegetation resulting from drought (Figure 8). While MY 2009/10 crop conditions in some areas were better than MY 2008/09, major northern rainfed regions were all well-below normal - implying significantly reduced crop vegetation and grain production.

(5) The majority of wheat and barley acreage (Figure 9, 10) is located in the rainfed growing areas. However, the majority of wheat production occurs in irrigated areas, while the majority of barley production occurs in the rainfed regions (Figure 9, 10). USDA estimates for the past ten years show that national wheat (Figure 11) and barley (Figure 12) production levels for MY 2008/09 and MY 2009/10 were the lowest in the past 10 years, with the exception of MY 2000/01 which was an even worse drought.

(6) Cumulative precipitation during the early planting period of the new MY 2010/11 crop season has been surprisingly positive, with well-above normal rainfall occurring in most regions (Figure 13). However, it should be noted that last years growing season (MY 2009/10) got off to a similarly favorable start, only to revert to drought in early winter. Cumulative precipitation for the first two decades (first 20 days) of November 2009 was in excess of 200% of normal for large parts of Iraq (Figure 14). Rainfall was higher than normal for most grain growing areas except for parts of Ninawa and Dahuk. However, when looking at percent-of-normal precipitation for the September 1- November 20 period, most of Iraq, including these two provinces, had higher than normal precipitation. It should be noted that though the early rainfall pattern has been favorable, the volume of rain has not been sufficient to saturate the soil profile and build up longer-term soil moisture reserves. This is especially important to consider in the rainfed growing areas, as sustained precipitation through the winter months will be required to enable a recovery in grain production to normal levels. In the short term, the rainfall forecast for the week ahead indicates that showers are expected over much of southern Iraq; leaving the rainfed northern regions primarily dry (Figure 15).

(7) A comparative analysis of satellite vegetation index data (NDVI) during November 2009 and 2008 (Figure 16) showed evidence that crop establishment was taking hold in parts of the rainfed northern provinces, particularly in Ninewa and the Kurdish governorates. However, the vast majority of Iraq's winter grain growing areas (including the primarily irrigated southern governorates) showed significant declines in green vegetation compared to last year. This indicates that planting progress has been delayed from normal, or that irrigation supplies are inadequate or restricted for the time being. Furthermore, NDVI change data comparing

vegetative crop conditions in November 2009 to the 6-year average showed that current crop development is well below normal over the majority of Iraq, except for parts of the Zagros Mountains of Kurdistan in northern Iraq (Figure 17). The substantial differences in crop development illustrated in these maps provide a cautionary warning that despite very favorable rainfall so far this year, early crop conditions throughout Iraq are much below normal. Crop development will be closely monitored in coming months to determine whether recovery from these early unfavorable conditions is evident.

(8) An evaluation of Iraq's existing water resources was also conducted, indicating that several major reservoirs or water bodies are well below normal storage capacity. This may directly impact sown area to winter grains in the irrigated regions of central and southern Iraq if government authorities decide to ration water to the agricultural sector. Reservoirs in eastern Turkey, by comparison, are generally at near-normal storage capacity, indicating a capacity to provide needed water supplies to Iraq through both the Tigris and Euphrates rivers. Lake levels for Buhayrat ath-Tharthar, Iraq's largest inland water body, are at their lowest levels since 2002 (Figure 18). There has been a significant and continuous decline in water levels at Lake Tharthar since the beginning of the drought in late 2007. The Haditha Dam, located on the Euphrates River, has also declined 65 percent since 2003 (Figure 19). The Mosul Dam, located on the Tigris River, shows only slightly decreased water levels - which may indicate that authorities have made efforts during the summer months to increase storage at this site in northern Iraq (Figure 20). Since both the Euphrates and Tigris Rivers originate within Turkey, dams within Turkey were also analyzed in a similar manner. The Batman Dam, which is on the Batman River tributary to the Tigris River, is the only major reservoir showing significantly lower levels compared with 2003 – a 26 percent decline(Figure 21). In comparison, on the Euphrates River, the Atatürk (Karababa) Dam shows only slightly reduced lake areas (Figure 22), little-to-no change for the Birecik Dam (Figure 23) and Karkamiş Dam (Figure 24). In Iran, the Karkheh Reservoir along the Karkheh River, which flows into the marshes of southern Iraq as well as the Tigris and Shatt-el-Arab rivers, also shows significantly lower water levels (Figure 25).

(9) A Winter Grains Crop Classification map for MY 2009/10 and a map of aboveground Iraqi water resources may be seen in the Appendix.

References

[1] Food and Agriculture Organization, AQUASTAT – FAO's Information System on Water and Agriculture, http://www.fao.org/nr/water/aquastat/countries/iraq/index.stm (Verified 1 December 2009)

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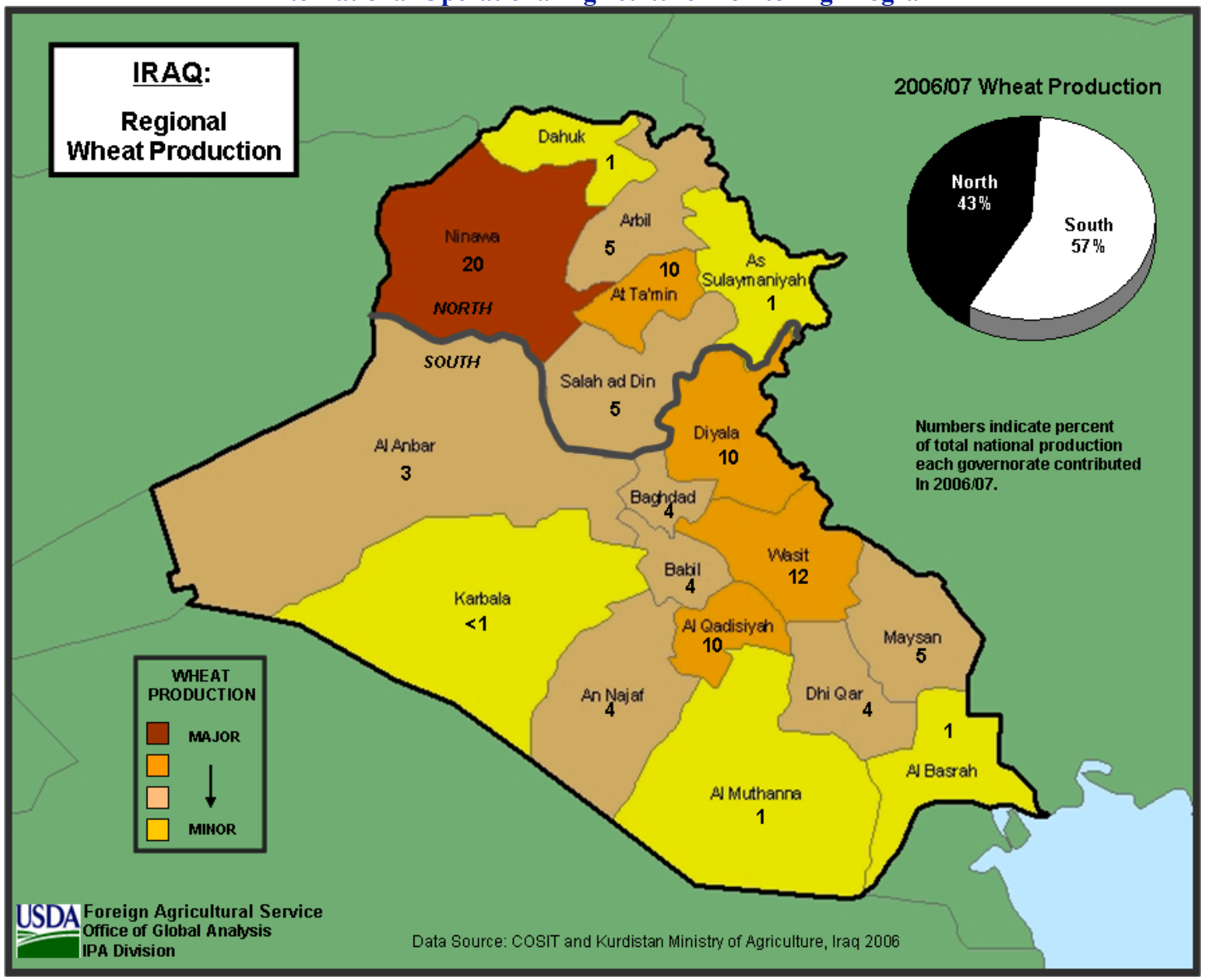


Figure 1. Percent of national wheat production broken down by agricultural region.

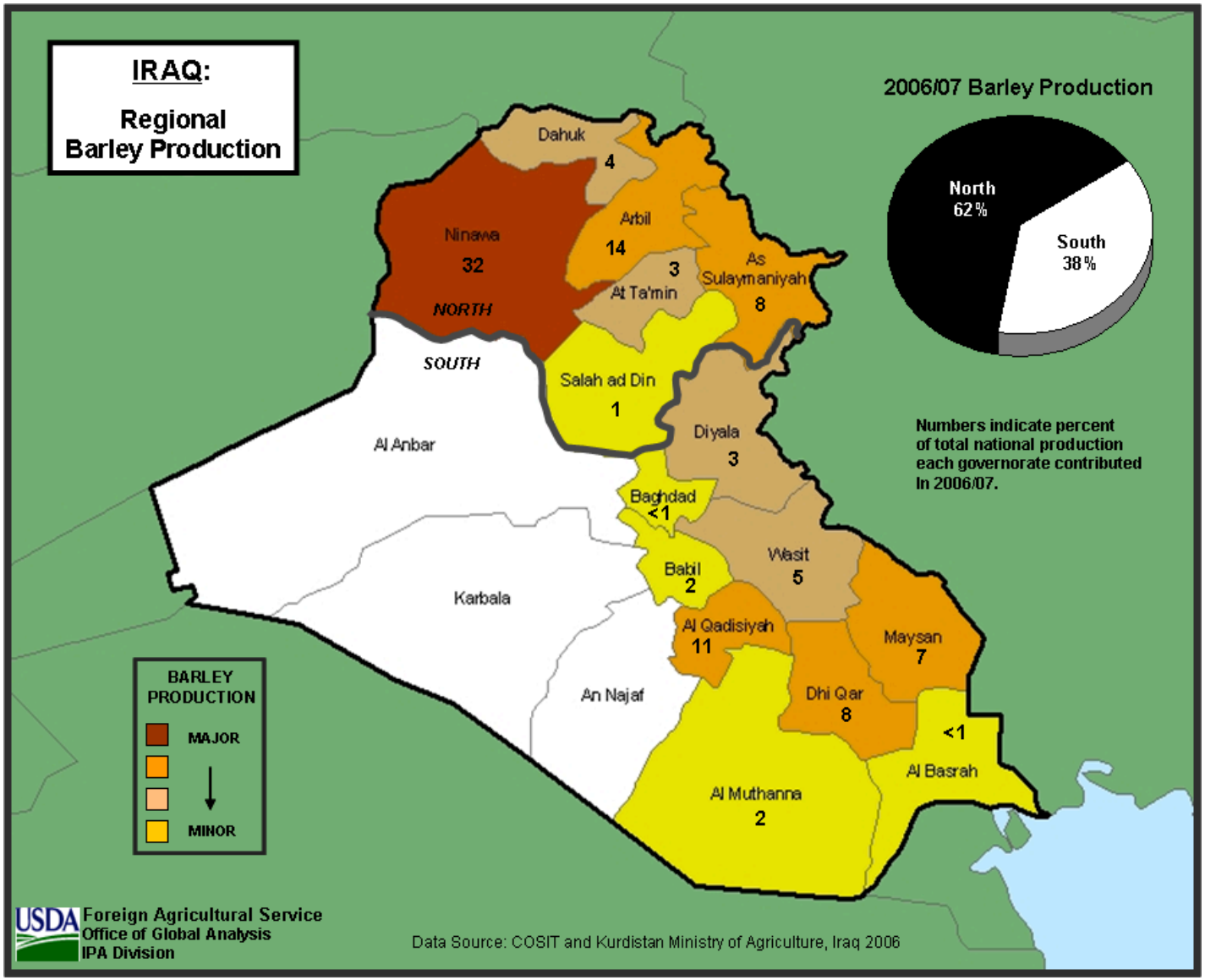


Figure 2. Percent of national barley production broken down by agricultural region.

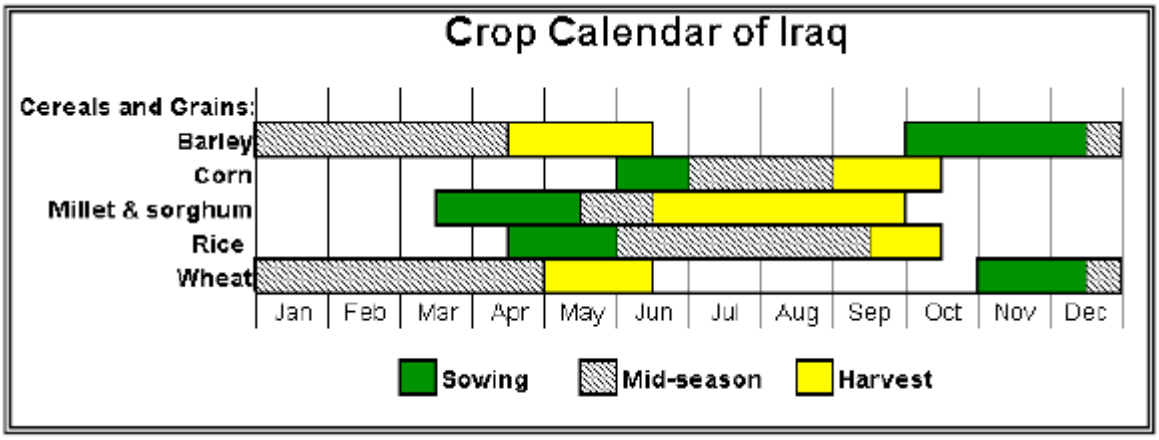


Figure 3. Crop calendar of Iraq.

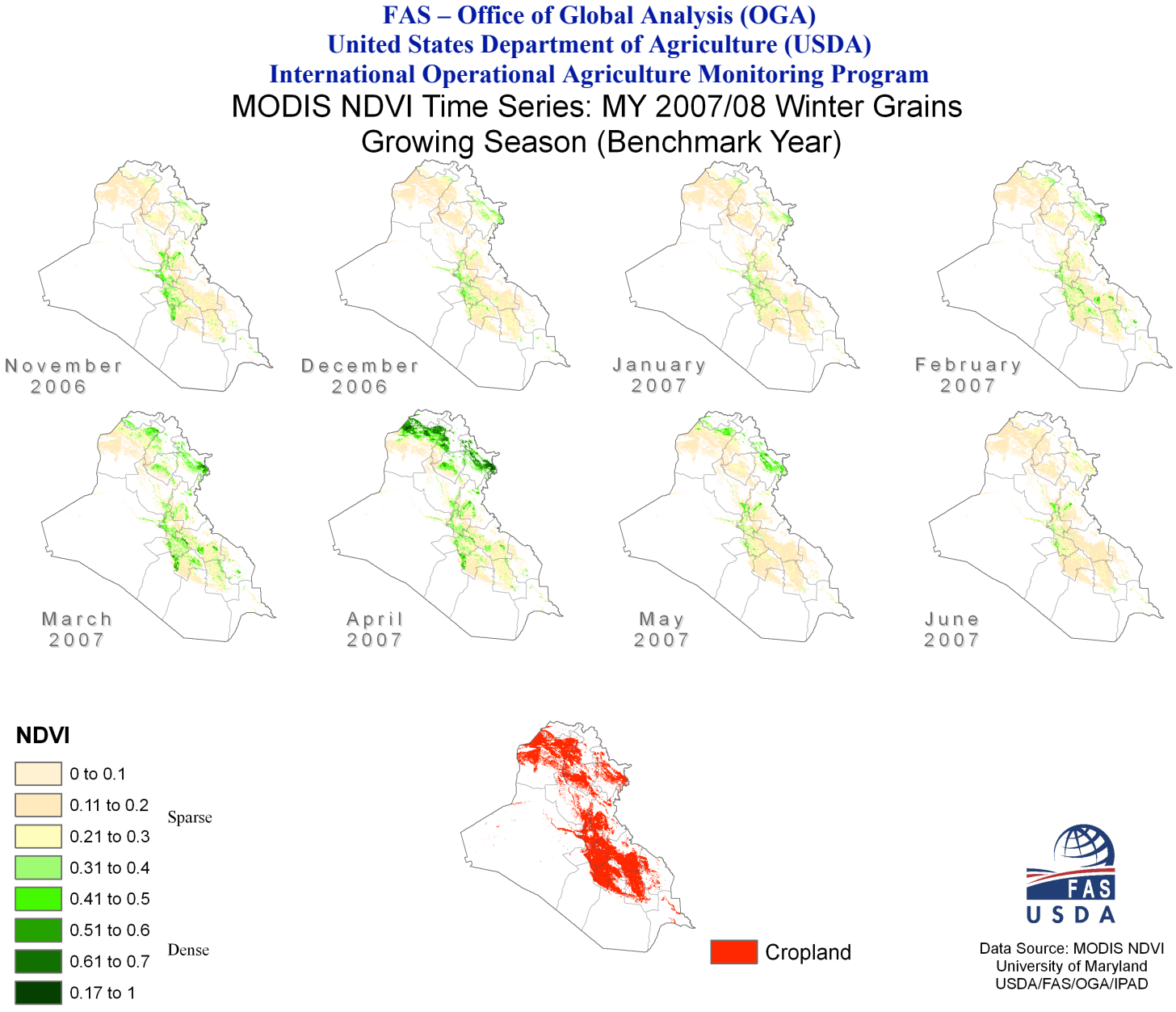
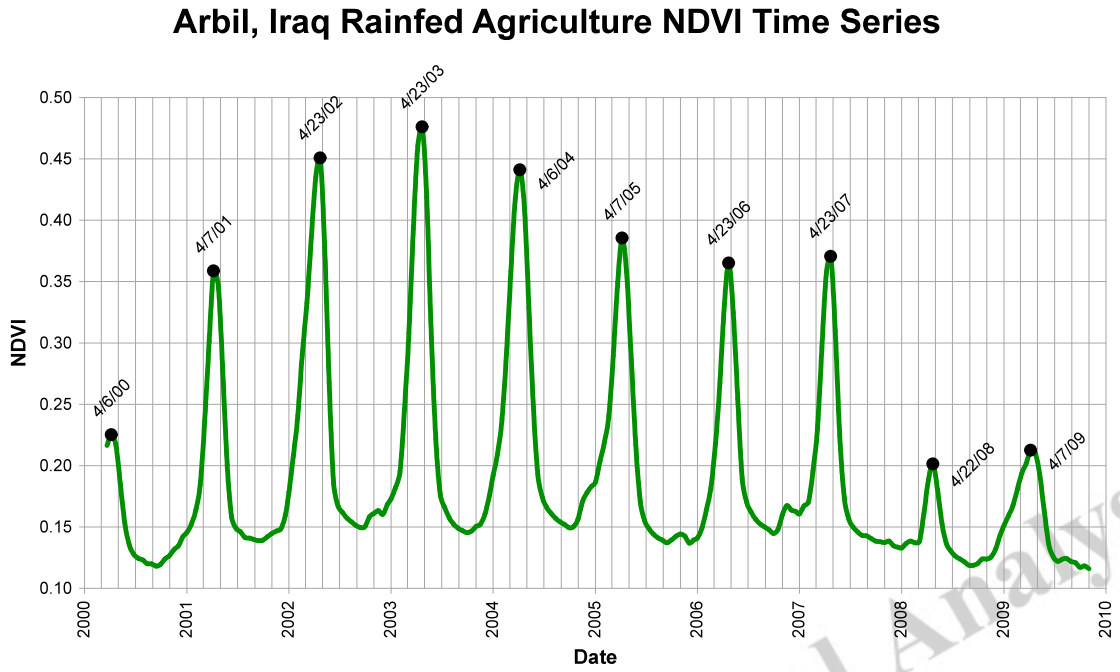


Figure 4. Vegetation growth through the winter grains growing season.



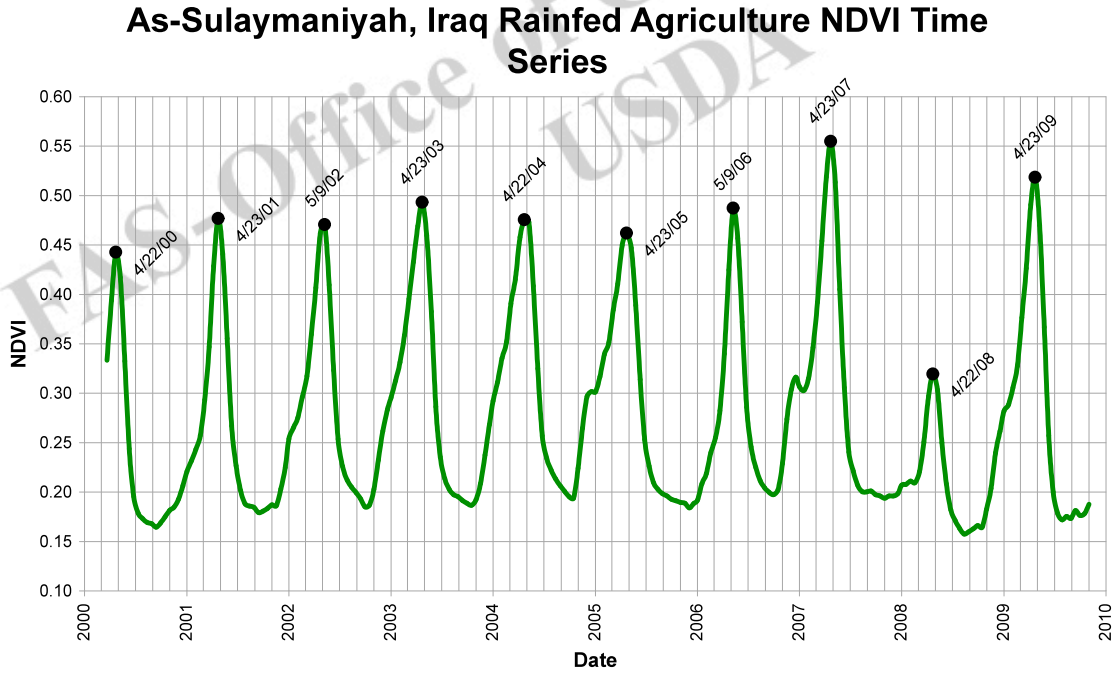
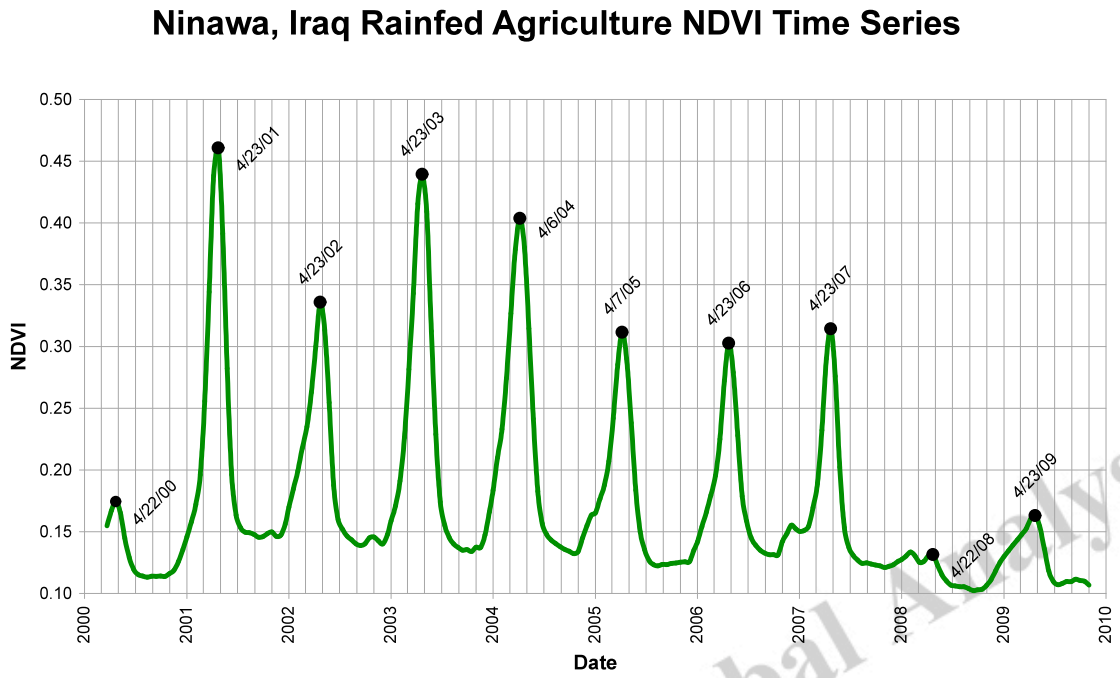


Figure 5a. MODIS NDVI time-series: important northern rainfed agricultural provinces.



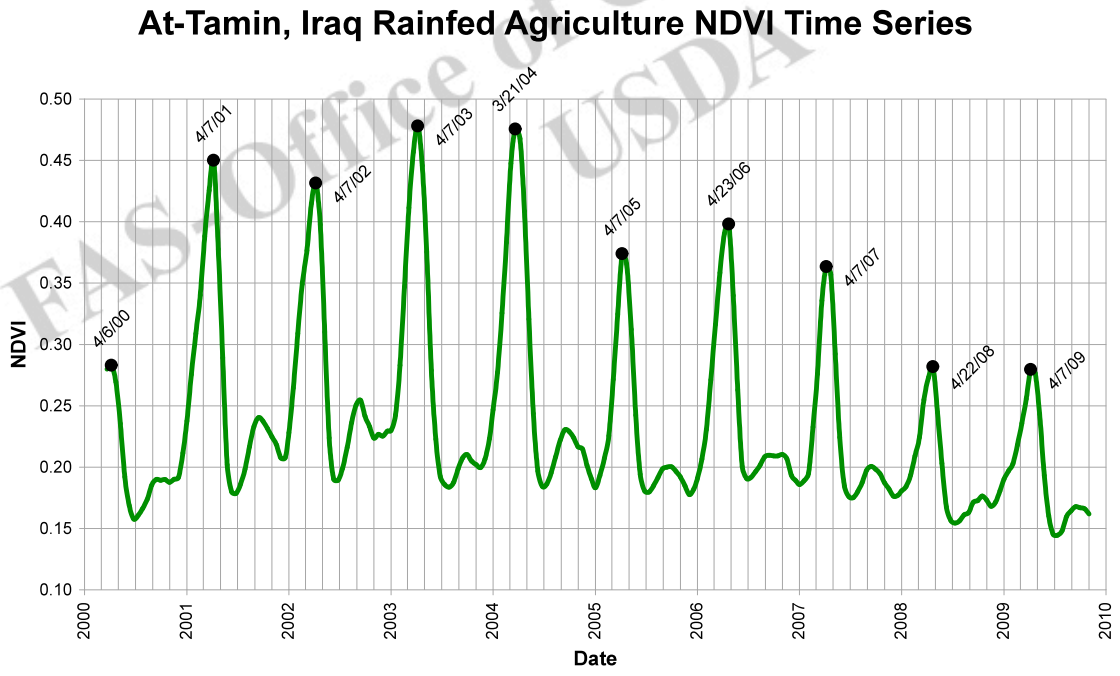


Figure 5b. MODIS NDVI time-series: important northern rainfed agricultural provinces.

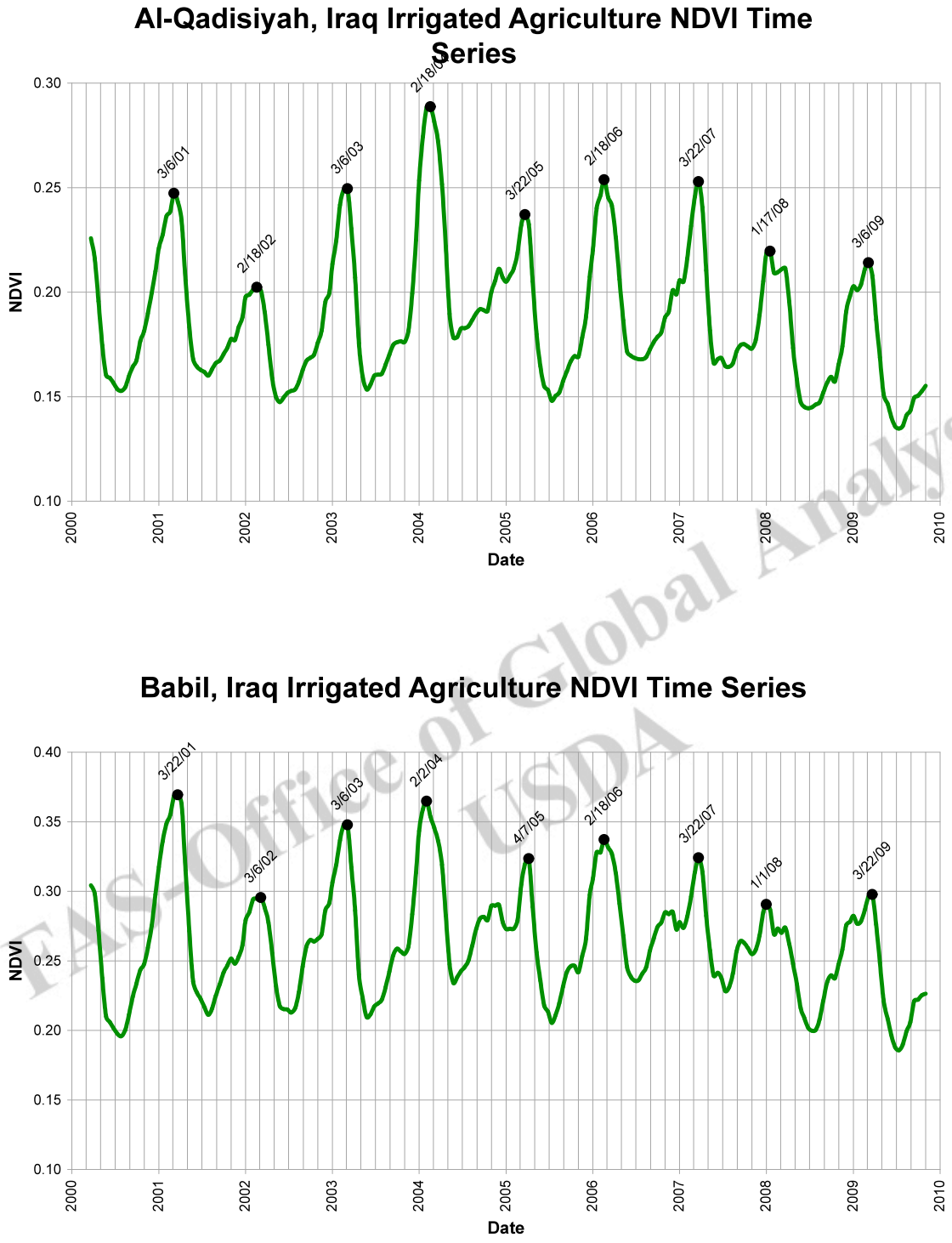
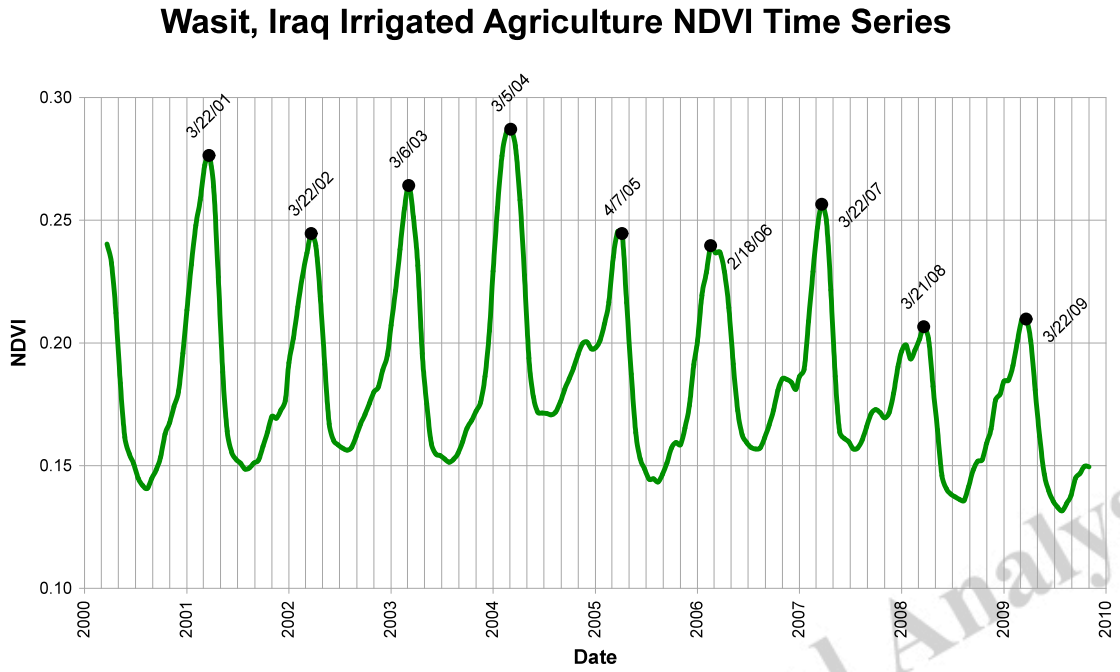


Figure 6a: MODIS NDVI time-series: important southern irrigated agricultural provinces.



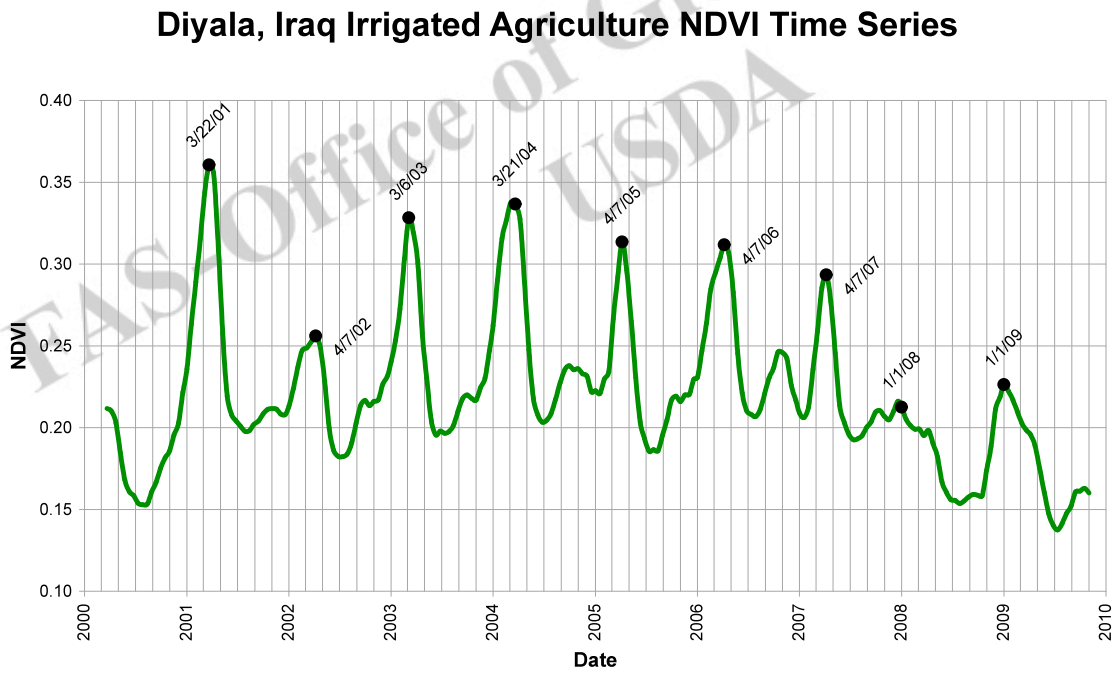


Figure 6b: MODIS NDVI time-series: important southern irrigated agricultural provinces.

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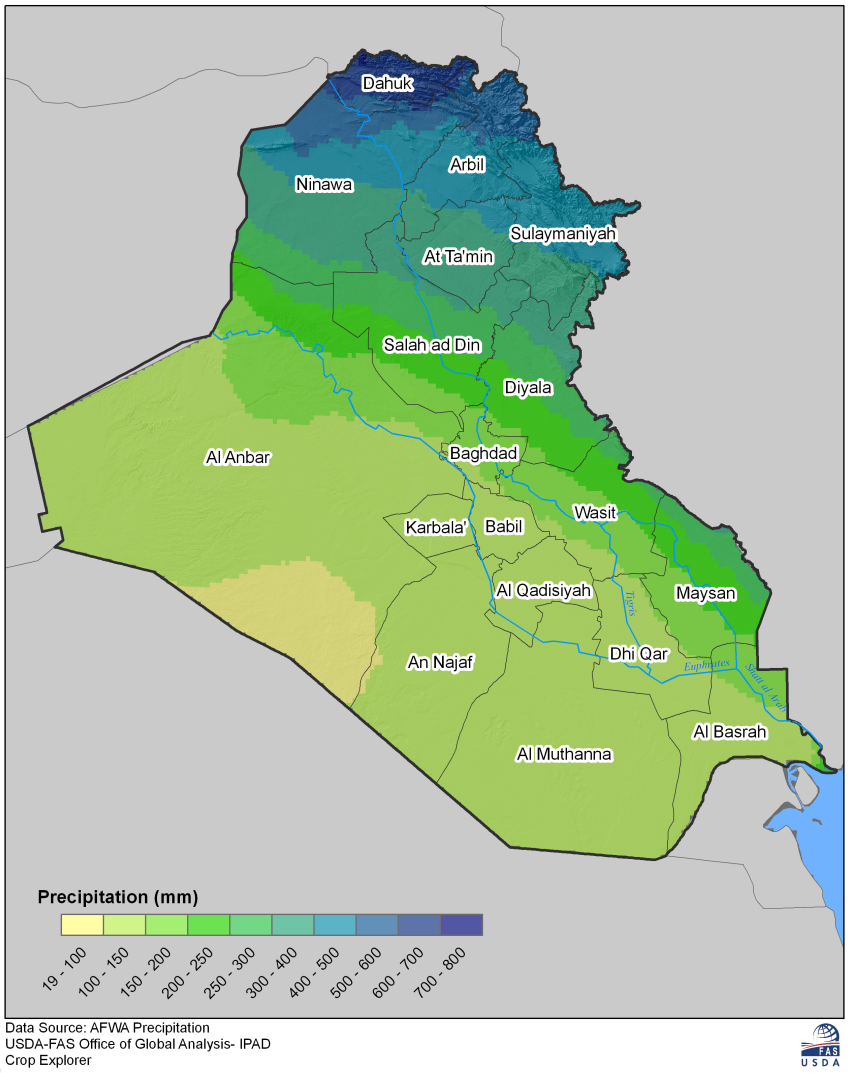
Iraq Average Annual Precipitation (mm)



Average Monthly Precipitation

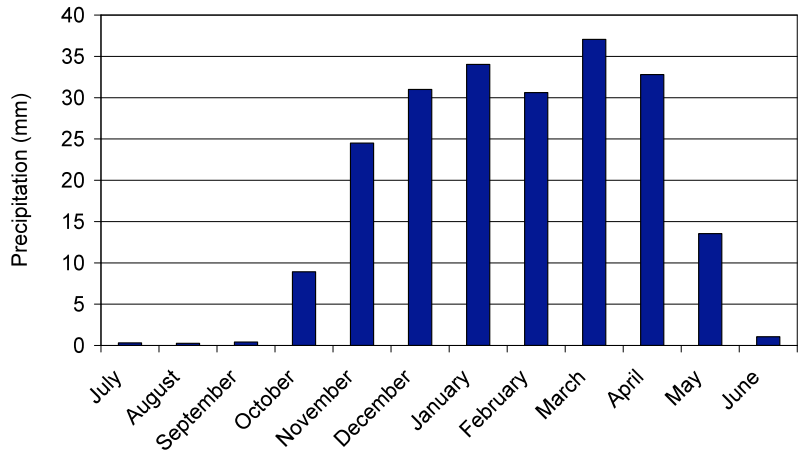


Figure 7. Average annual cumulative precipitation and average national precipitation by month.

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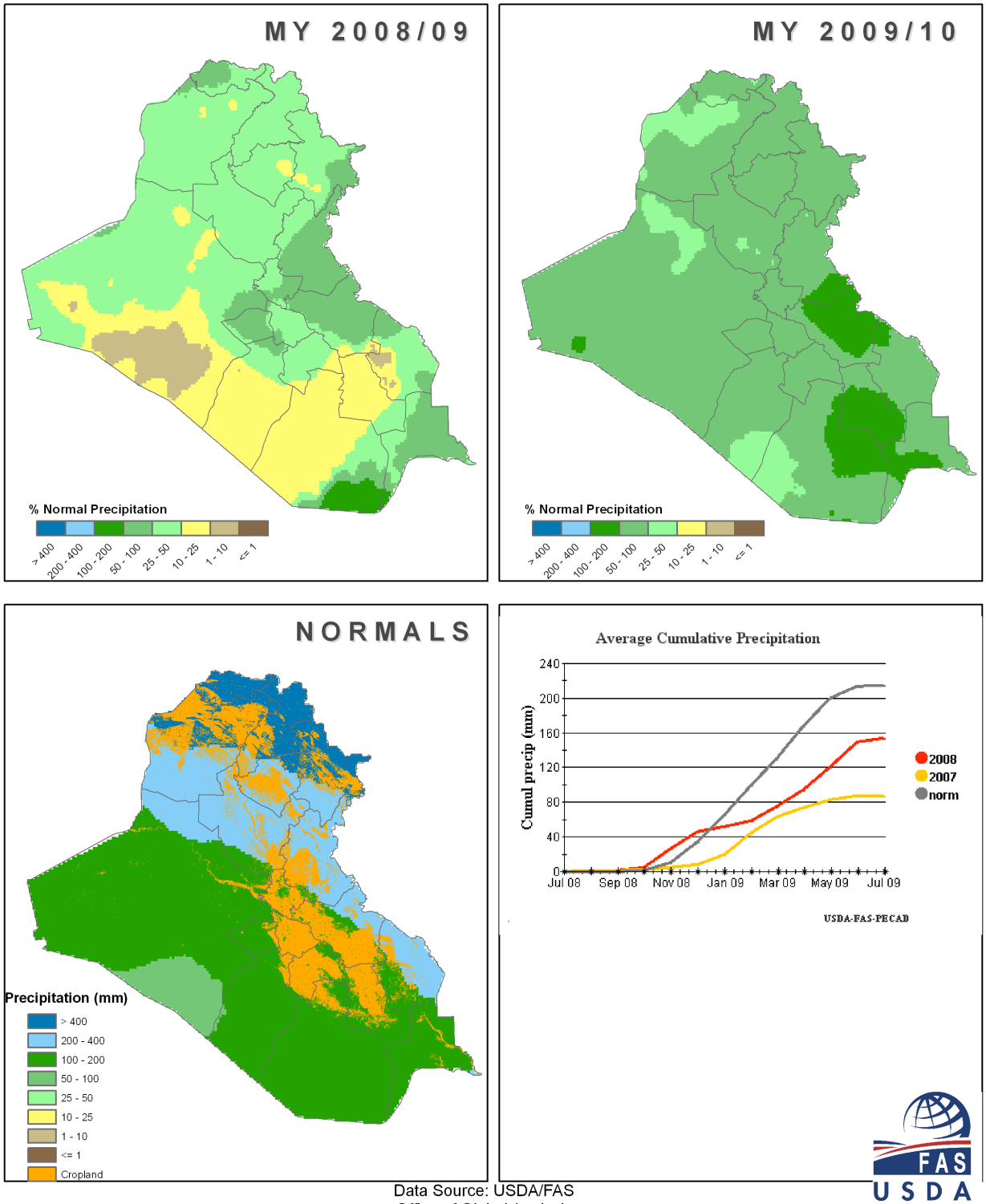
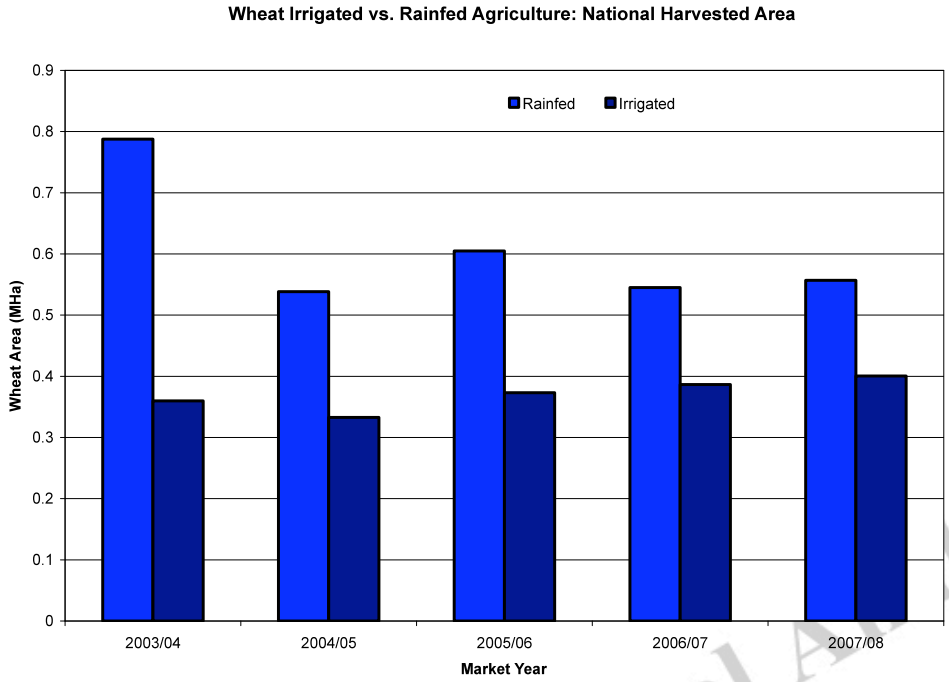
Percent of Normal Precipitation: Previous Two Winter Grains Seasons



Data Source: USDA/FAS
Office of Global Analysis

Figure 8. Cumulative percent of normal rainfall during prior two wheat seasons highlighting the 2008 and 2009 drought years.



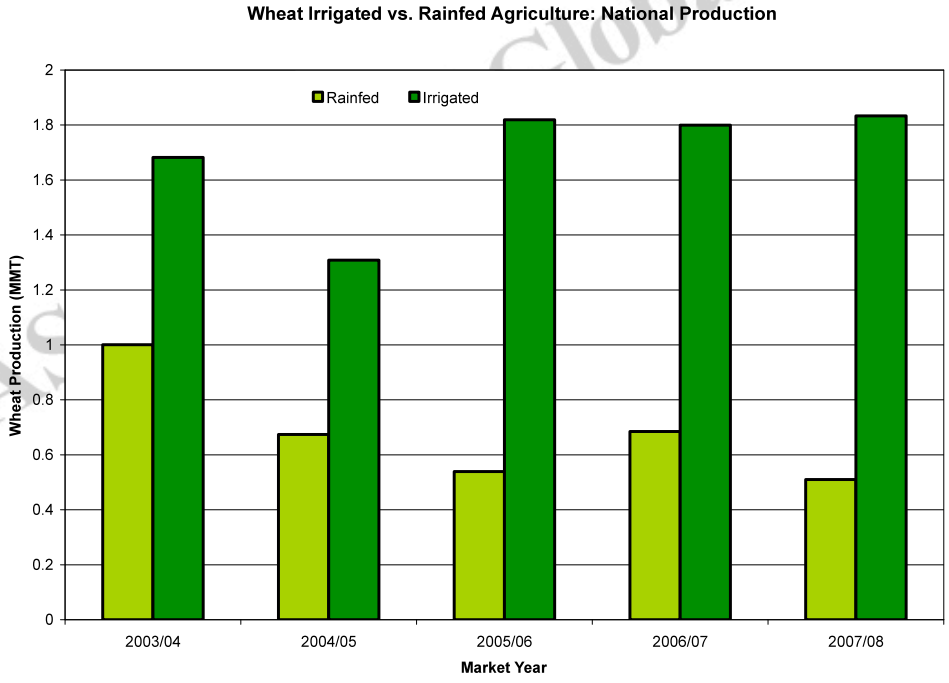
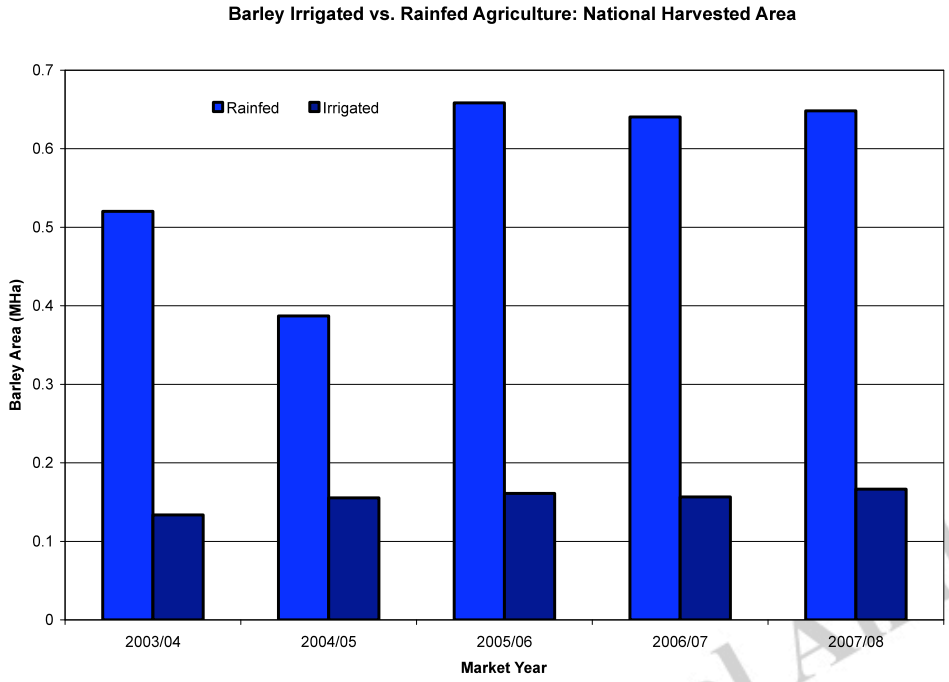


Figure 9. Historical wheat area and production from rainfed and irrigated sources 2003 to 2007. Data were provided by Central Organization for Statistics and Information Technology (COSIT) and USDA estimates of the rainfed Kurdish provinces of Dahuk, Arbil, and As-Sulaymaniyah.



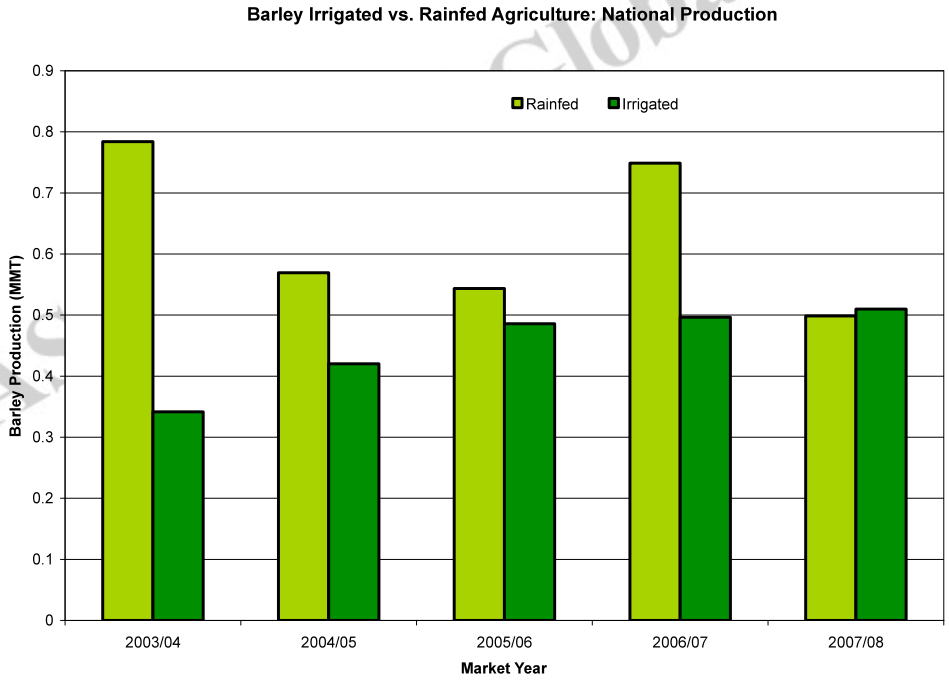


Figure 10. Historical barley area and production from rainfed and irrigated sources 2003 to 2007. Data were provided by Central Organization for Statistics and Information Technology (COSIT) and USDA estimates of the rainfed Kurdish provinces of Dahuk, Arbil, and As-Sulaymaniyah.

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Commodity	Attribute	Country	MY 2000/2001	MY 2001/2002	MY 2002/2003	MY 2003/2004	MY 2004/2005	MY 2005/2006	MY 2006/2007	MY 2007/2008	MY 2008/2009	MY 2009/2010
Wheat	Area (1000 HA)	Iraq	986	1,592	2,016	2,159	1,776	1,887	1,852	1,883	1,133	1,200
	Yield (MT/HA)	Iraq	1.18	1.29	1.34	1.24	1.12	1.25	1.34	1.24	1.15	1.13
	Production (1000 MT)	Iraq	1,161	2,055	2,698	2,683	1,983	2,358	2,484	2,343	1,304	1,350

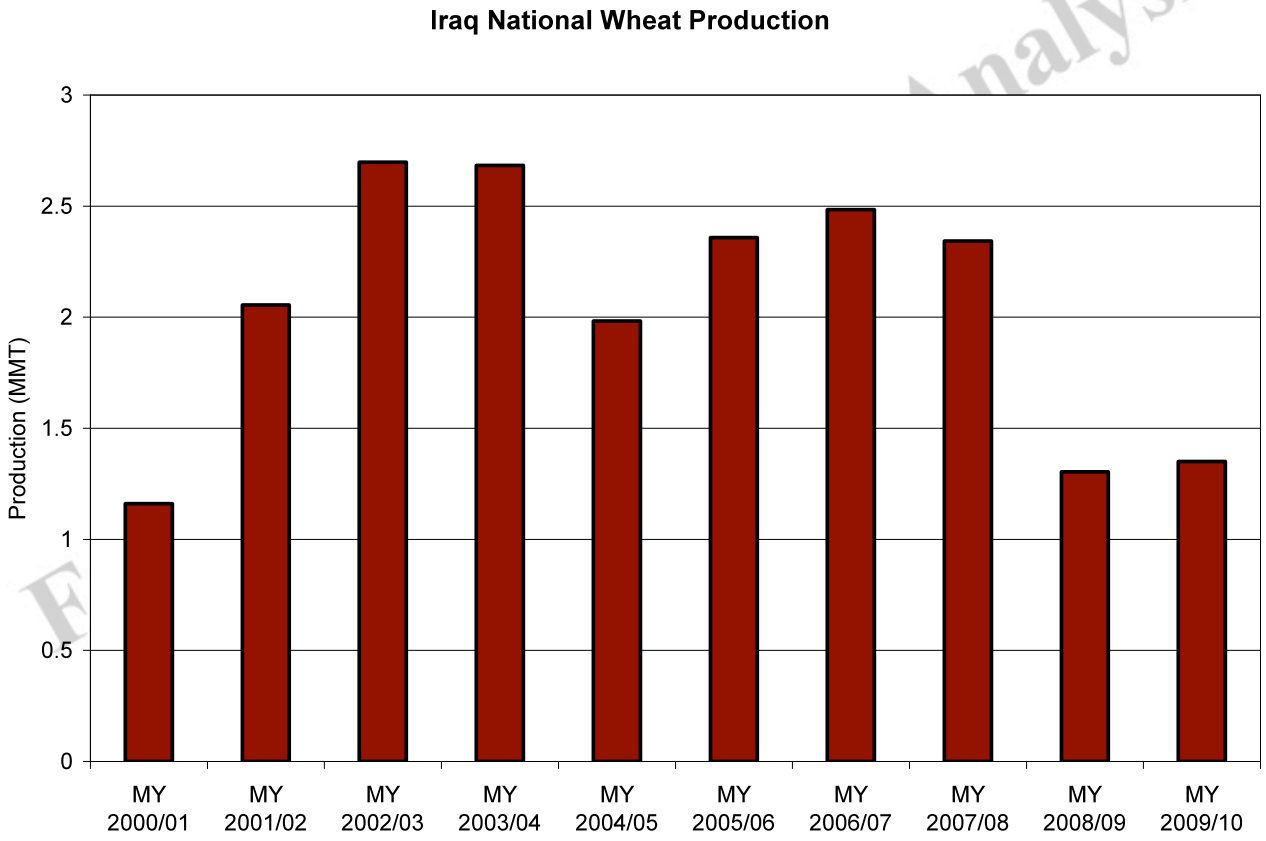

Figure 11. National wheat production statistics previous 10 crop seasons.

Commodity	Attribute	Country	MY 2000/2001	MY 2001/2002	MY 2002/2003	MY 2003/2004	MY 2004/2005	MY 2005/2006	MY 2006/2007	MY 2007/2008	MY 2008/2009	MY 2009/2010
Barley	Area (1000 HA)	Iraq	379	767	1,200	1,288	1,108	1,401	1,406	1,440	499	500
	Yield (MT/HA)	Iraq	0.74	1.06	0.91	0.87	0.89	0.73	0.89	0.74	0.86	0.9
	Production (1000 MT)	Iraq	280	811	1,087	1,126	989	1,029	1,245	1,060	431	450

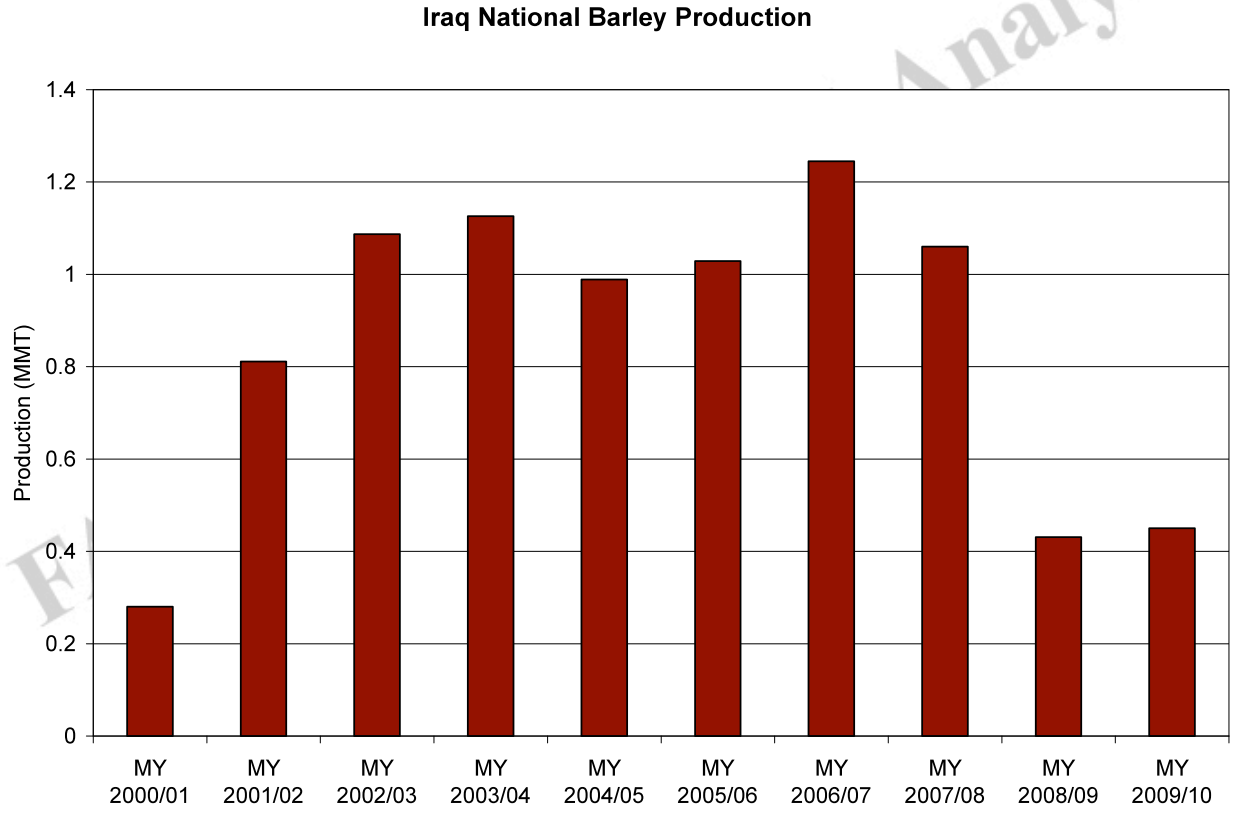

Figure 12. National barley production statistics previous 10 crop seasons.

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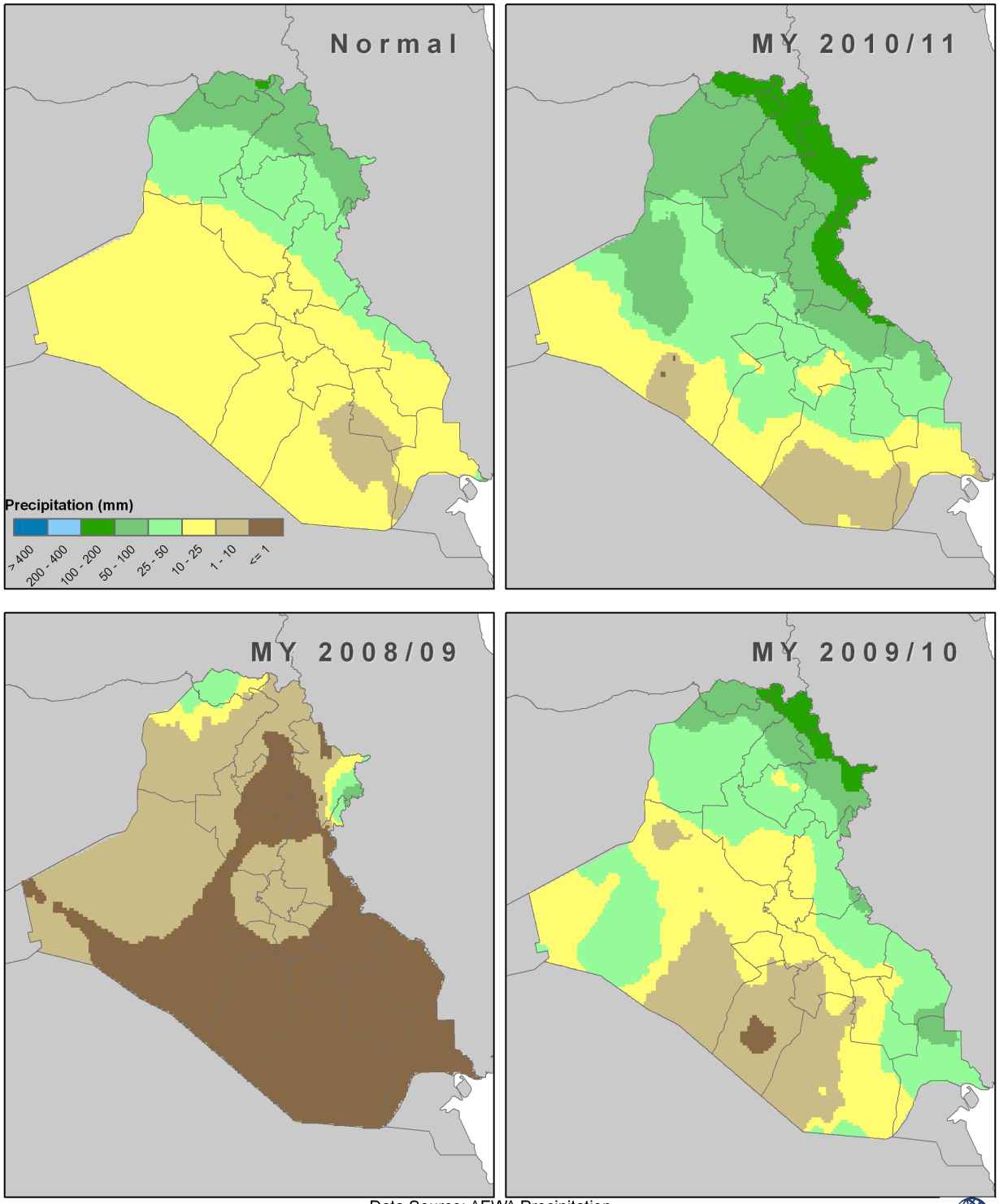
Cumulative Precipitation: September 1 - November 20



Data Source: AFWA Precipitation
USDA-FAS
Office of Global Analysis

Figure 13. Season to date cumulative precipitation, September 1 to November 20. Current year compared against previous two crop seasons.

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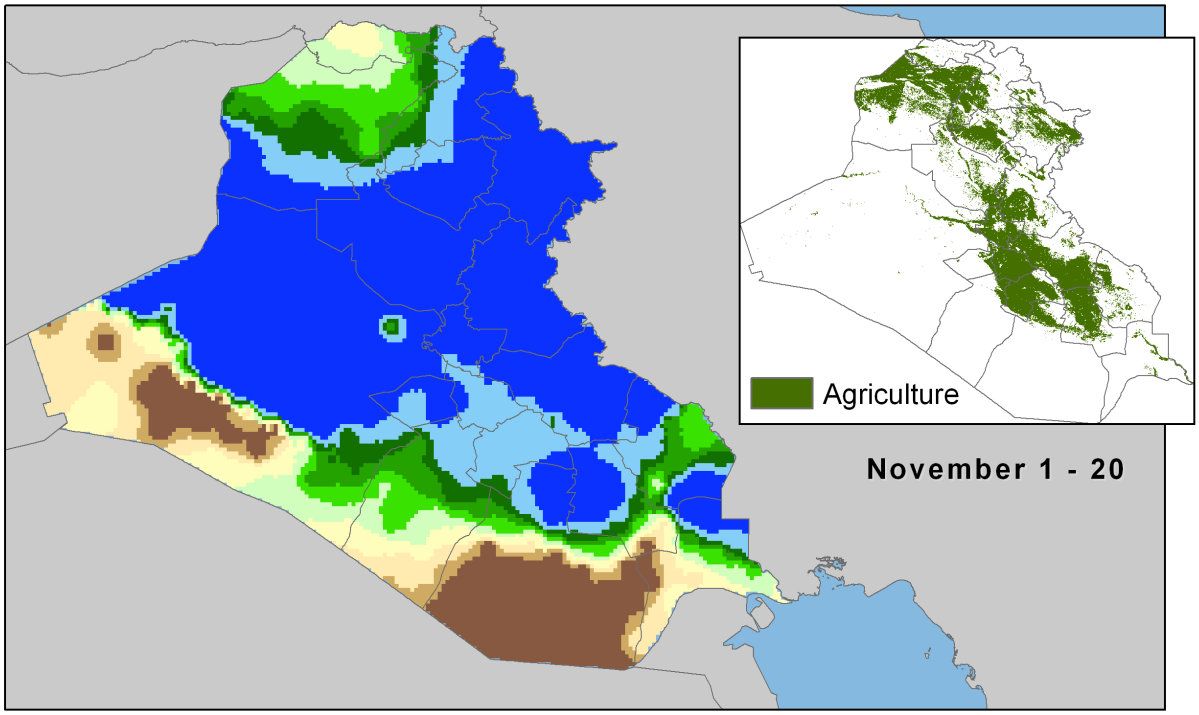
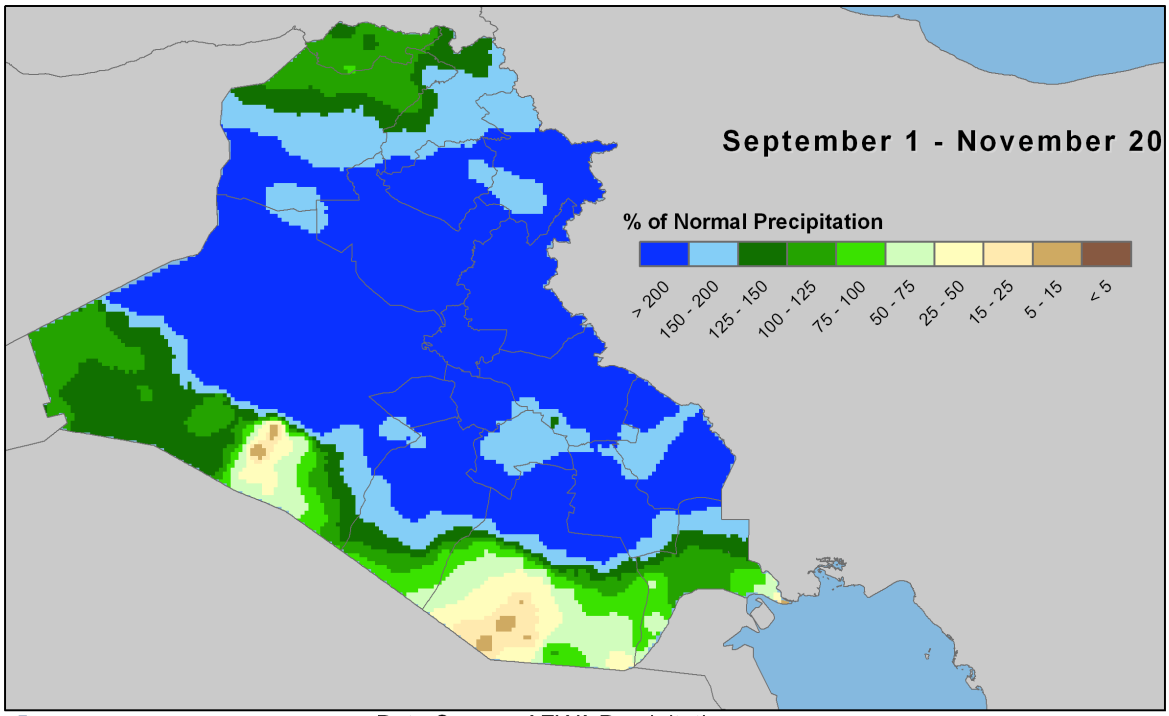
Percent of Normal Precipitation





Data Source: AFWA Precipitation
USDA-FAS, Office of Global Analysis, IPAD
Crop Explorer

Figure 14. Precipitation for MY 2009/10 in comparison with normals.

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7-day Precipitation Forecast over Agricultural Lands: November 30 - December 7, 2009

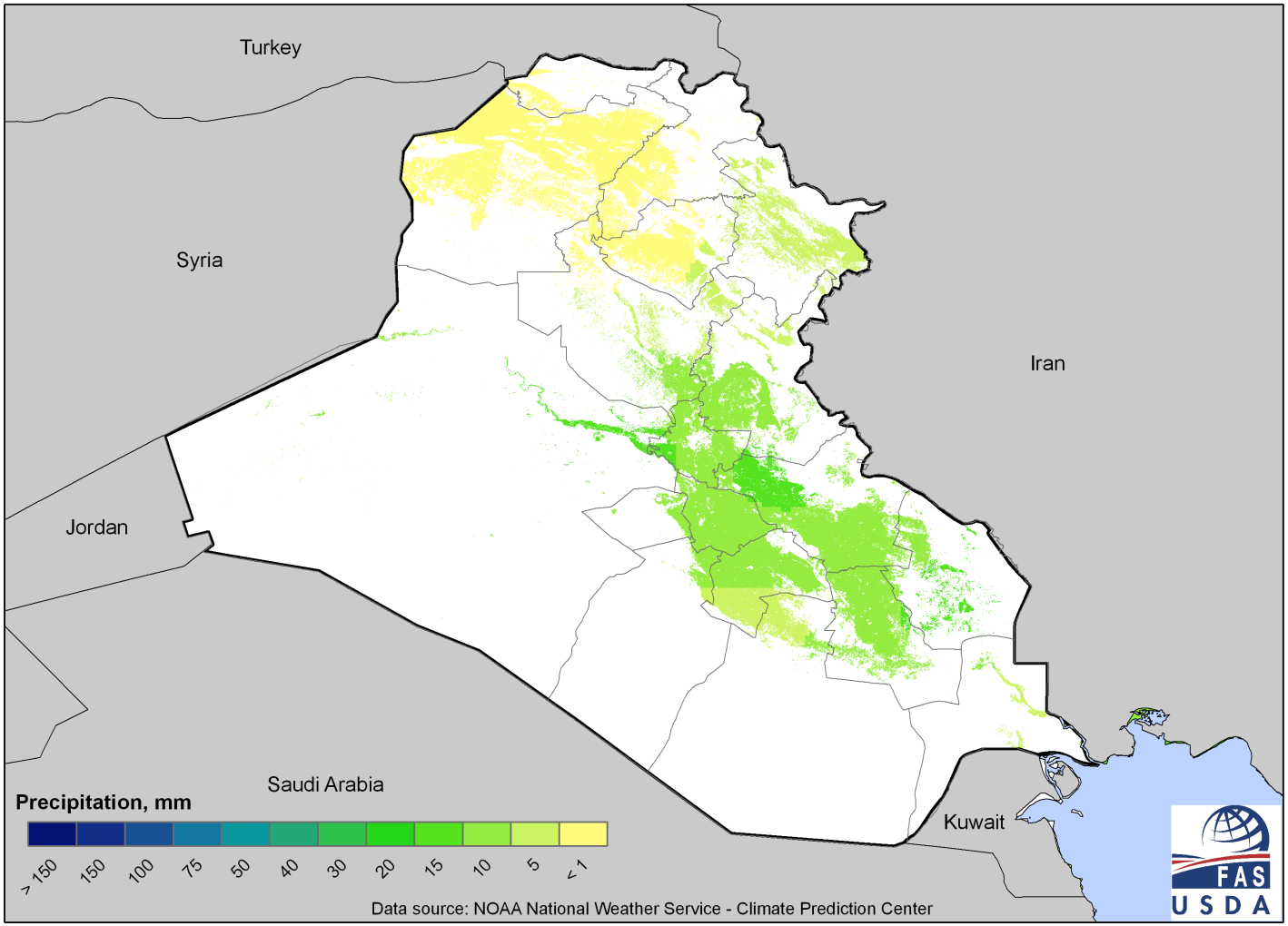

Figure 15. Seven-day precipitation forecast.

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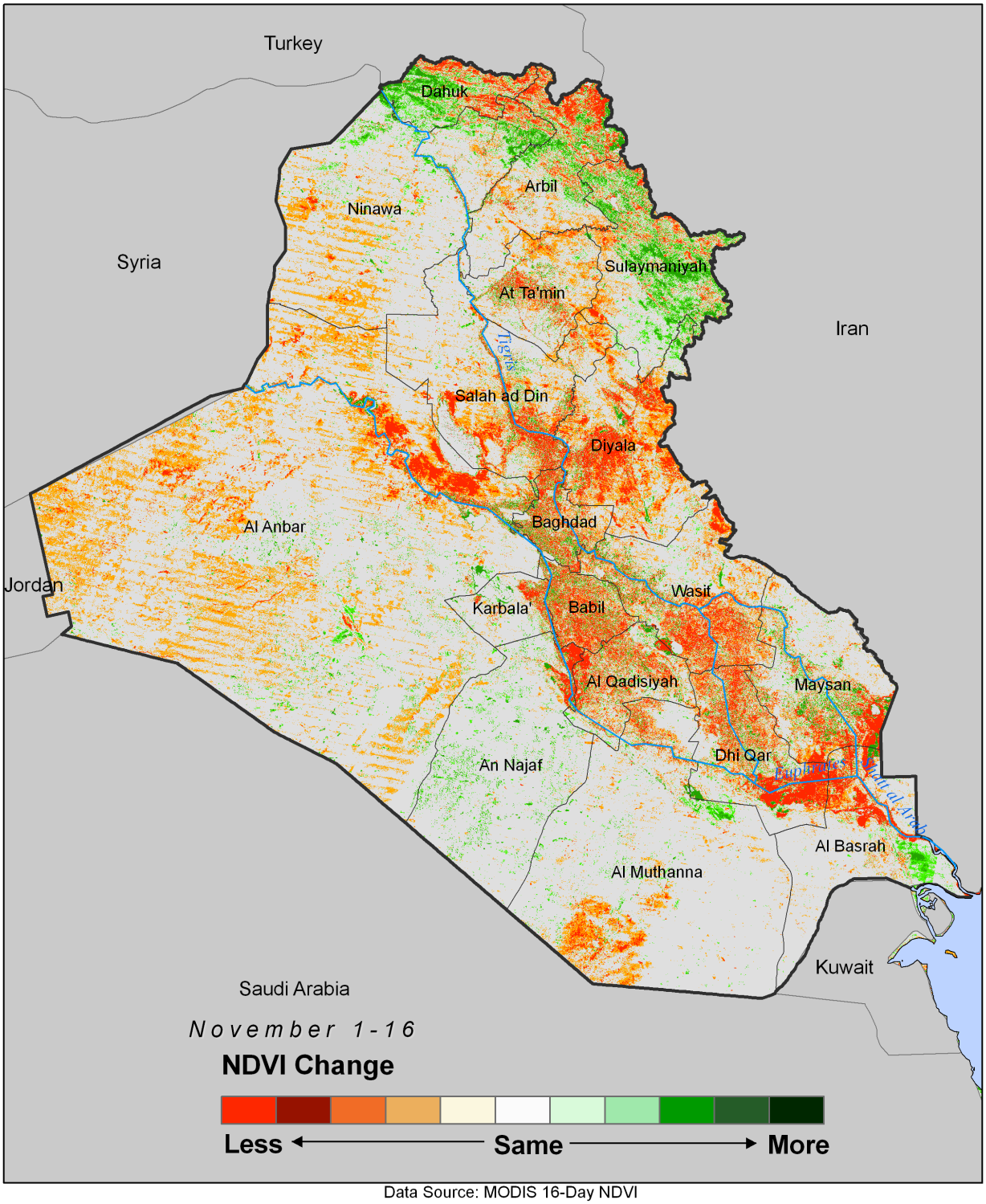
MODIS NDVI Change: MY 2010/11 vs. MY 2009/10



Data Source: MODIS 16-Day NDVI
Data Provided by: University of Maryland
Supporting: USDA/FAS/OGA/IPAD

Figure 16. Change in MODIS NDVI: MY 2010/11 vs. MY 2009/10 drought year.

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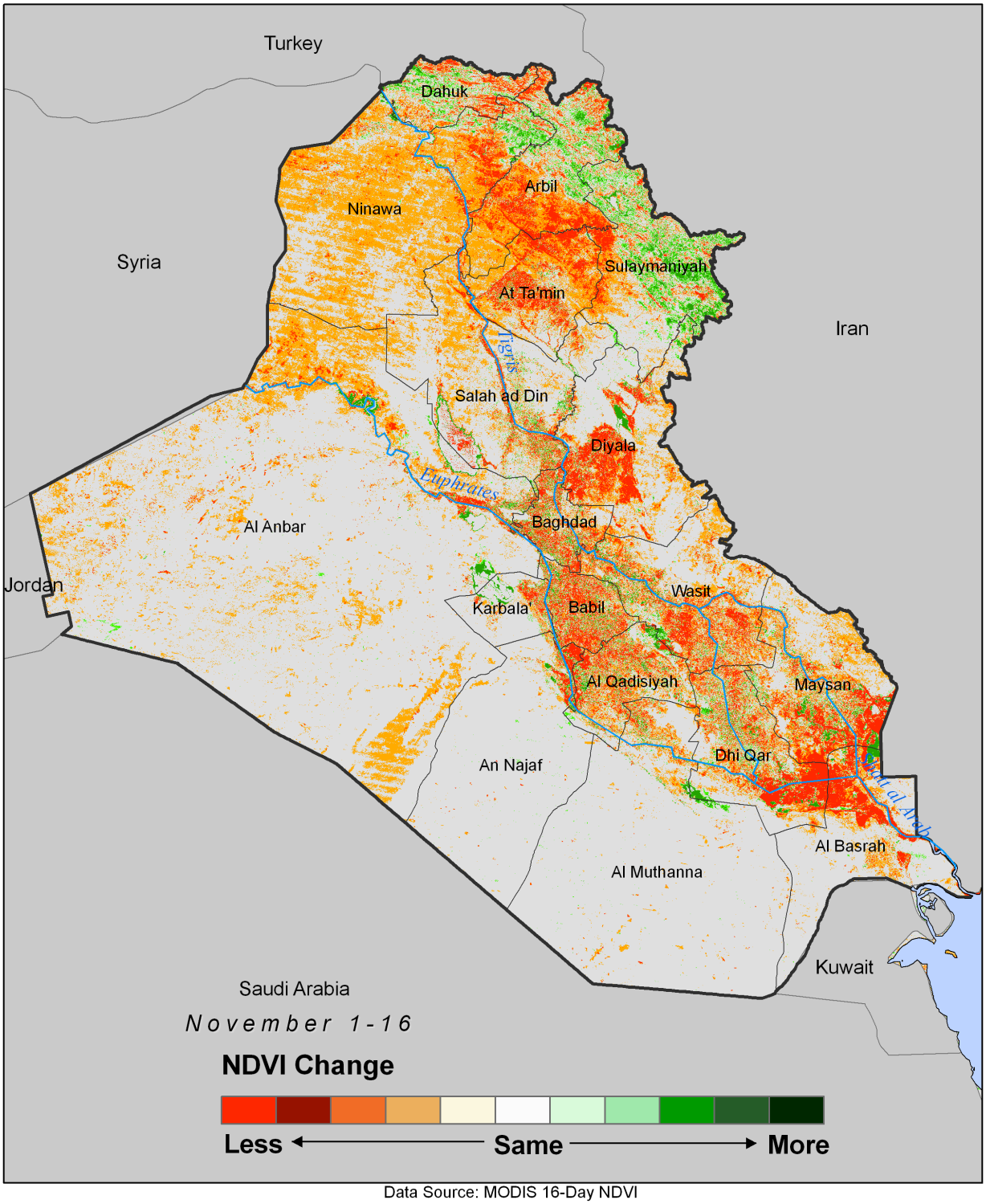
MODIS NDVI Change: MY 2010/11 vs. 6 Year Mean



Data Source: MODIS 16-Day NDVI
Data Provided by: University of Maryland
Supporting: USDA/FAS/OGA/IPAD

Figure 17. Change in MODIS NDVI: MY 2010/11 vs. 6-year average.

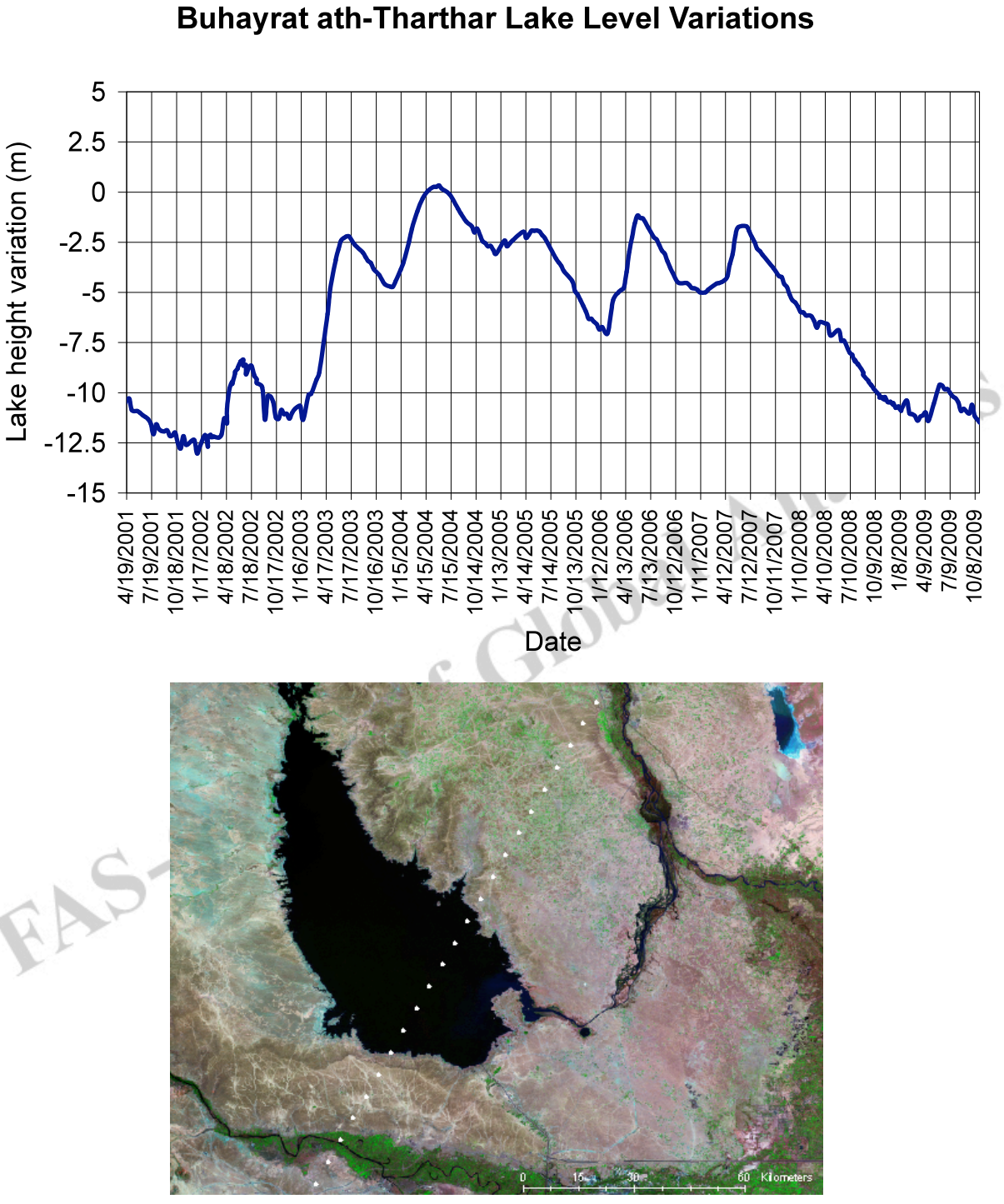


Figure 18. Graph of Lake Tharthar height variations in meters. Data from TOPEX/POSEIDON, Jason-1, and OSTM data. Data provided courtesy USDA, NASA, Raytheon, UMD, and CNES. Green pixels denote live vegetation, including cultivated fields.

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Haditha Dam Lake Area
Euphrates River, Al-Anbar Province, Iraq

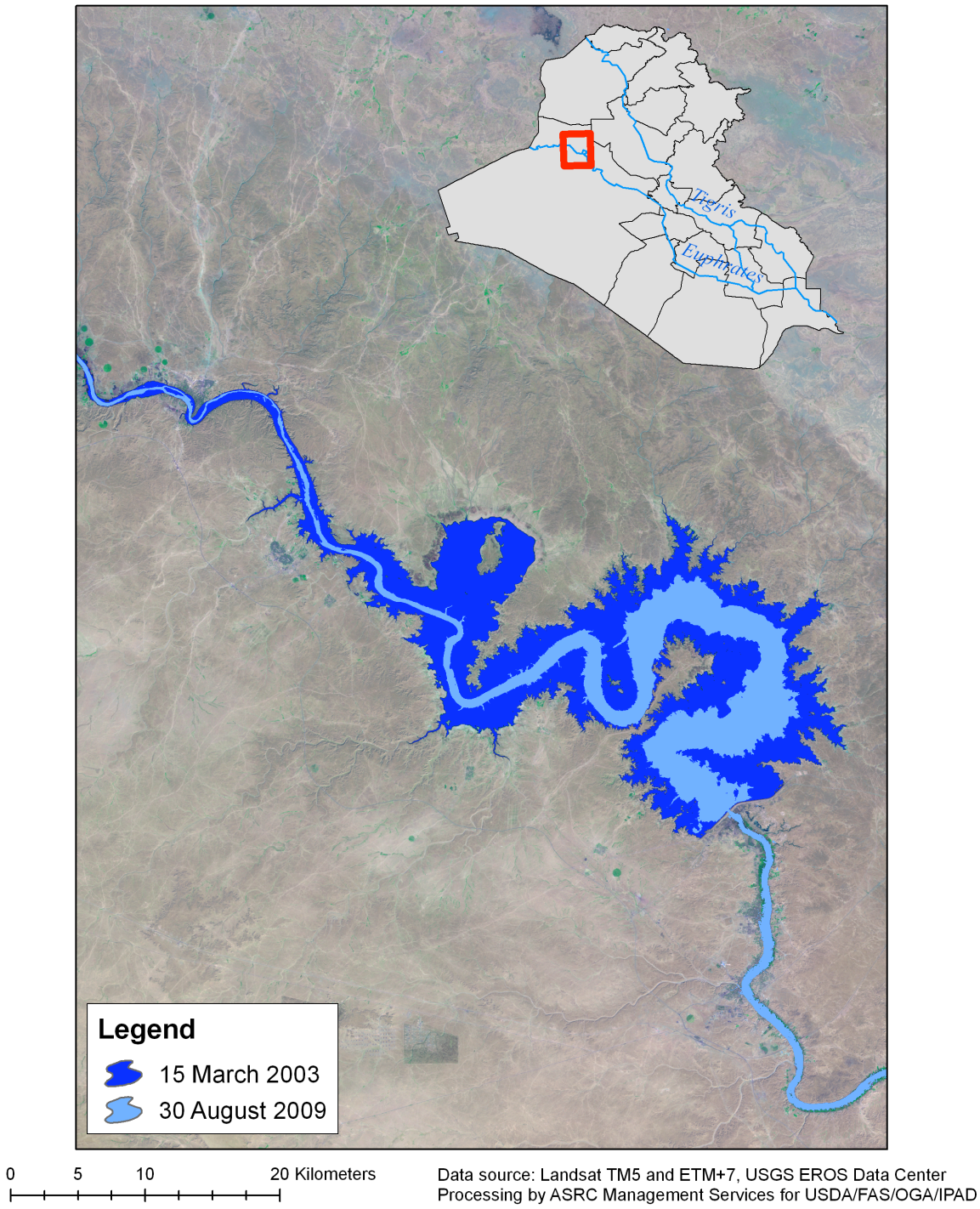

Figure 19. Haditha Dam lake areas, showing a dramatic 65% decrease in lake area between 2003 and 2009. Green pixels denote live vegetation, including cultivated fields. Background image acquired by Landsat ETM+ on 15 March 2003.

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Mosul Dam Lake Area
Tigris River, Ninawa and Dahuk Provinces, Iraq

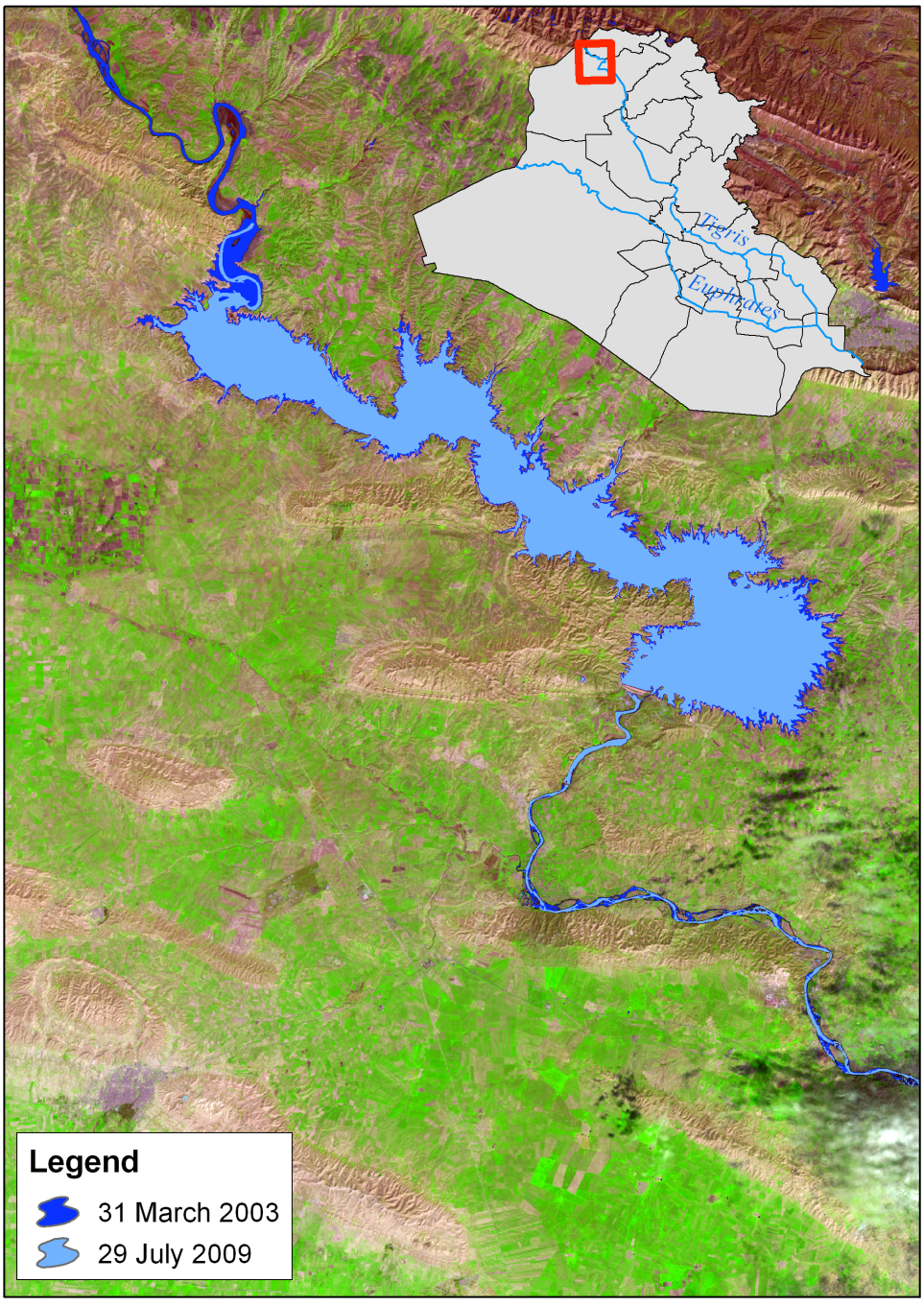

Figure 20. Mosul Dam lake areas, showing a 12% decrease in lake area between 2003 and 2009. Green pixels denote live vegetation, including cultivated fields. Background image acquired by Landsat ETM+ on 31 March 2003.

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Batman Dam Lake Area, Batman River
Tigris River Tributary, Turkey

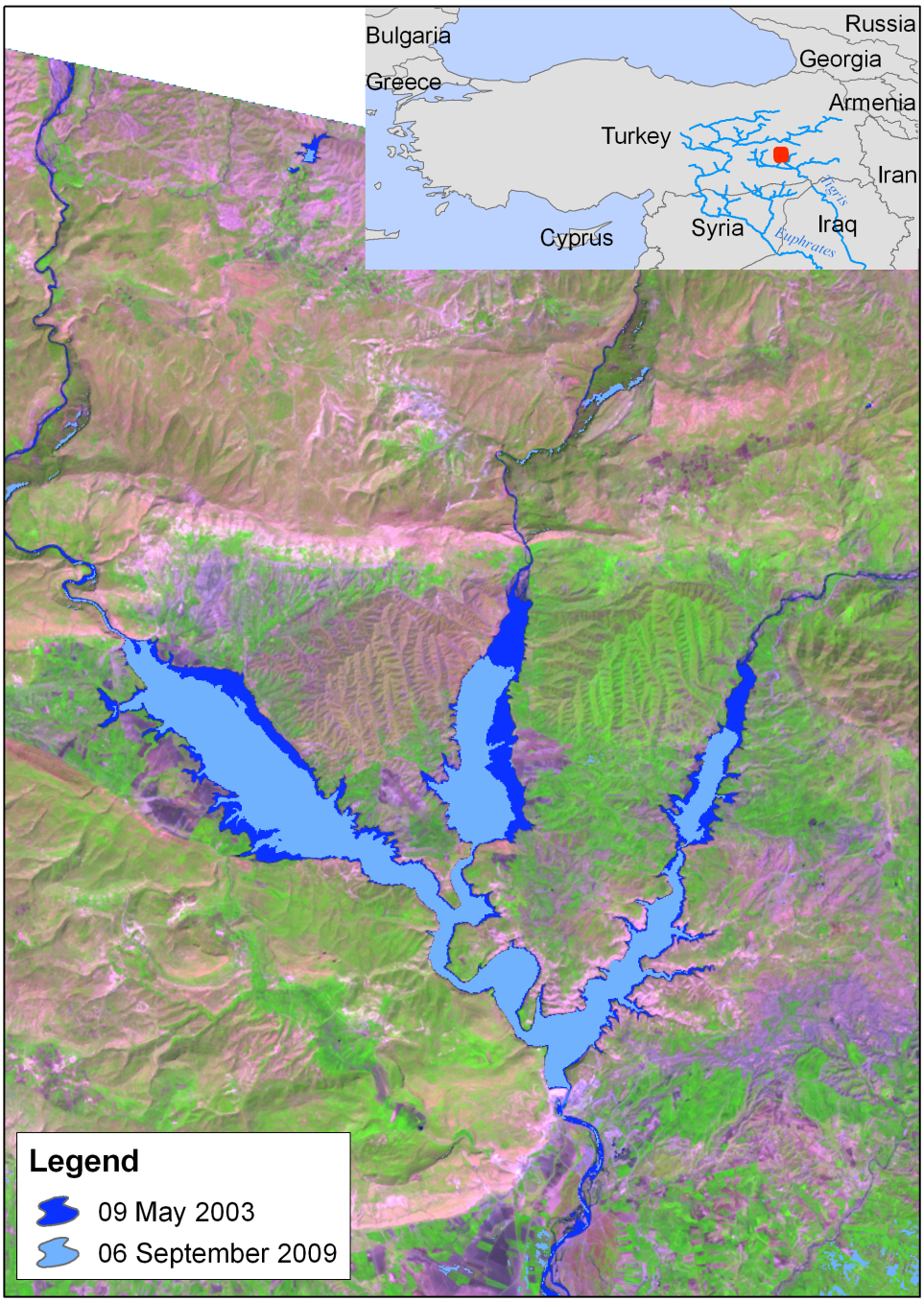

Figure 21. Batman Dam lake areas, showing a 26% decrease in lake area between 2003 and 2009. Green pixels denote live vegetation, including cultivated fields. Background image acquired by Landsat ETM+ on 09 May 2003.

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Atatürk (Karababa) Dam Lake Areas
Euphrates River Basin, Turkey

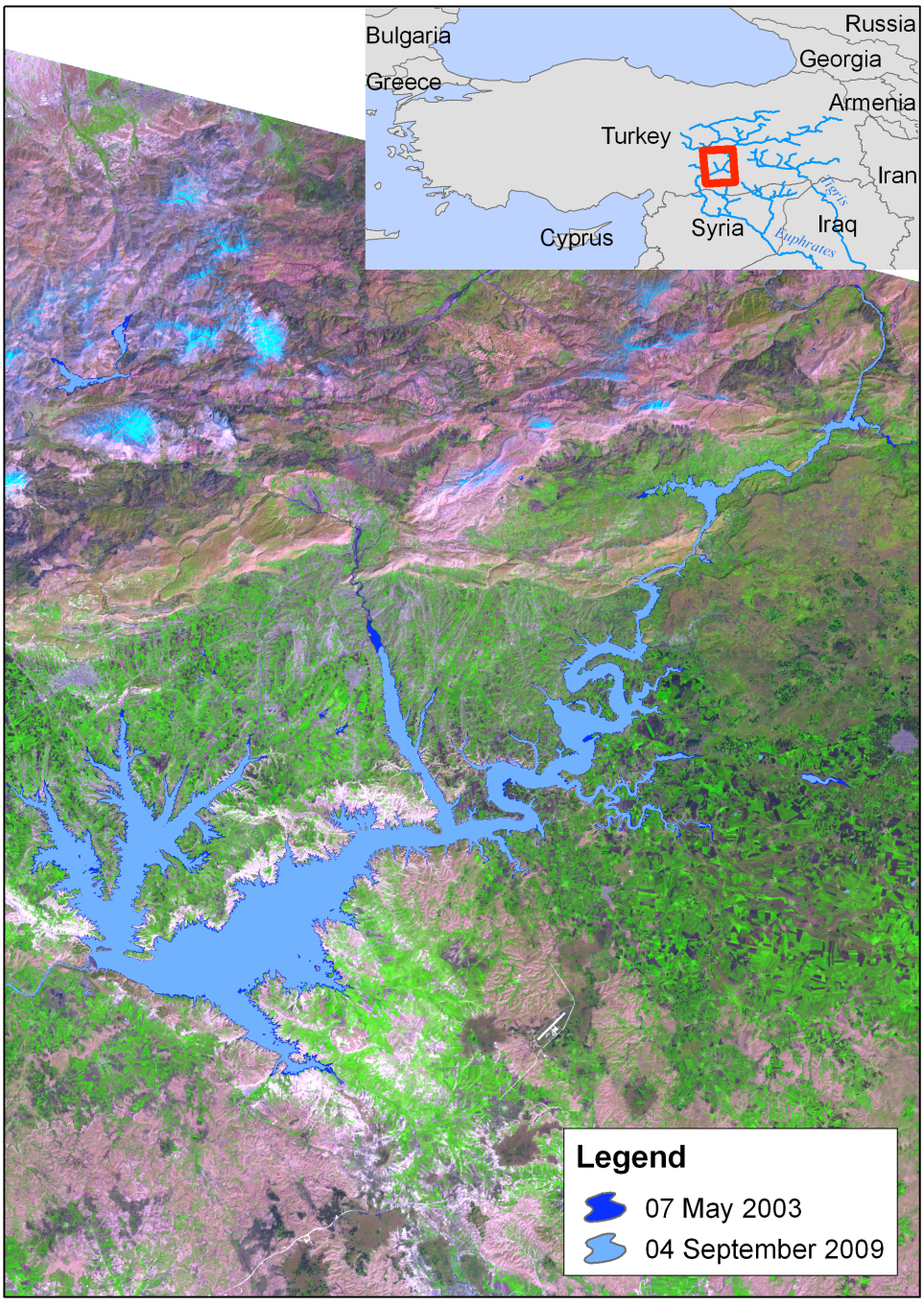

Figure 22. Atatürk (Karababa) Dam lake areas, showing a minimal decrease in lake area between 2003 and 2009. Green pixels denote live vegetation, including cultivated fields. Background image acquired by Landsat ETM+ on 07 May 2003.

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Birecik Dam Lake Area
Euphrates River Basin, Turkey

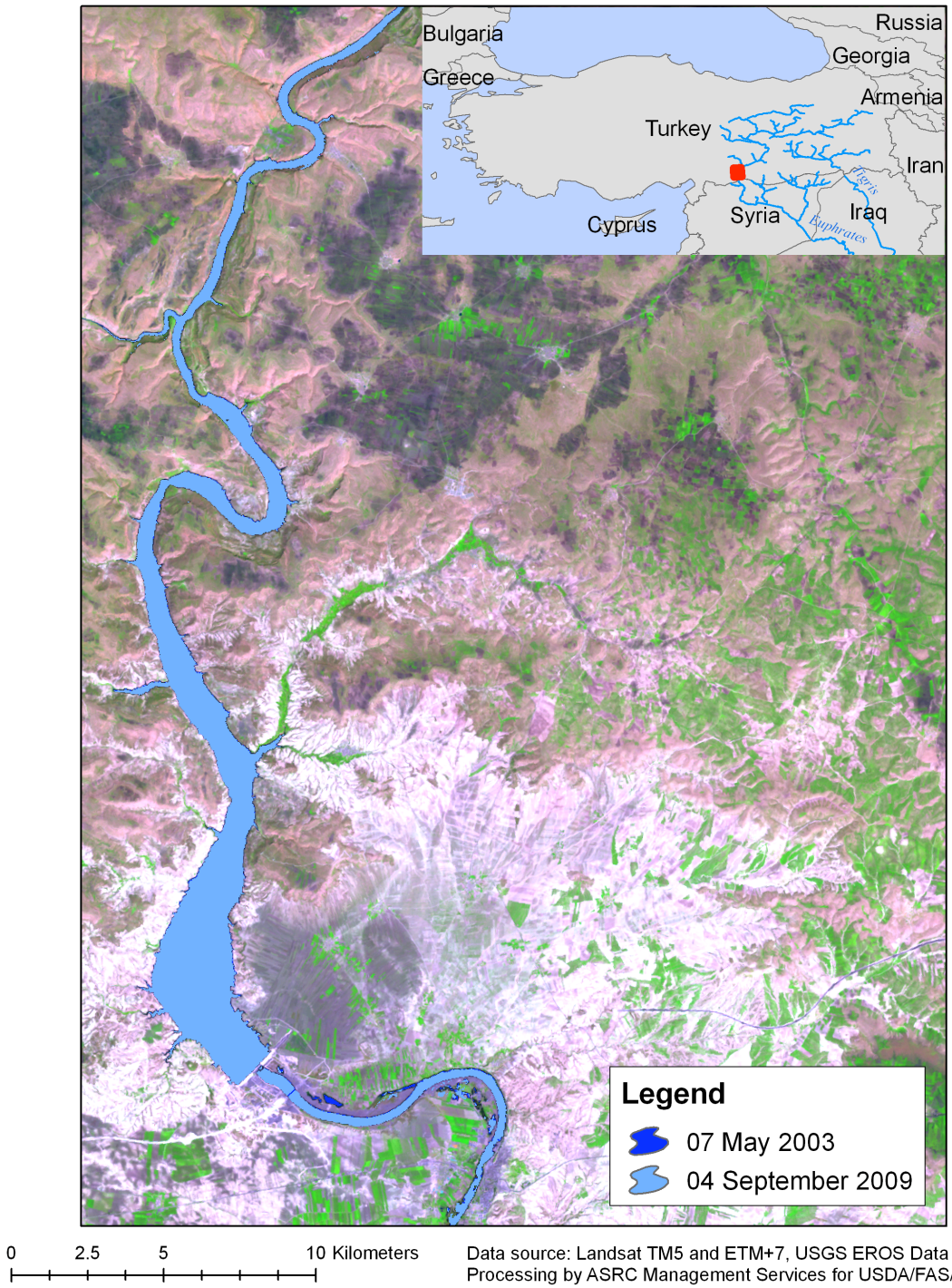

Figure 23. Birecik Dam lake areas, showing a minimal decrease in lake area between 2003 and 2009. Green pixels denote live vegetation, including cultivated fields. Background image acquired by Landsat ETM+ on 07 May 2003.

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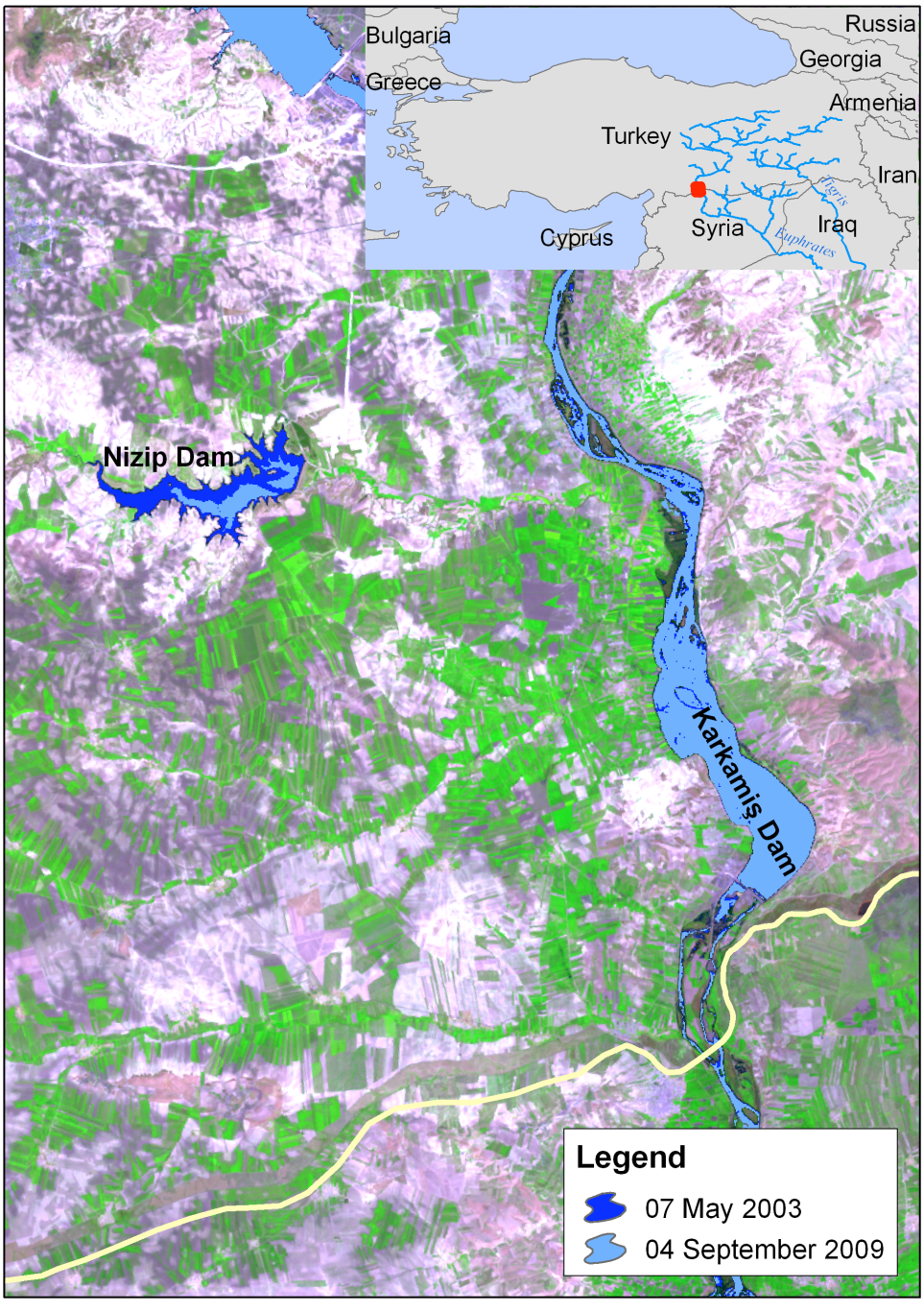
Nizip and Karkamiş Dam Lake Areas
Euphrates River Basin, Turkey



Data source: Landsat TM5 and ETM+7, USGS EROS Data Center
Processing by ASRC Management Services for USDA/FAS/OGA/IPAD

Figure 24. Nizip and Karkamiş Dam lake areas. The Nizip Dam shows a dramatic 70% decrease in lake area, while the Karkamiş Dam is minimally affected. Green pixels denote live vegetation, including cultivated fields. Yellow line denotes border between Turkey and Syria. Background image acquired by Landsat ETM+ on 07 May 2003.

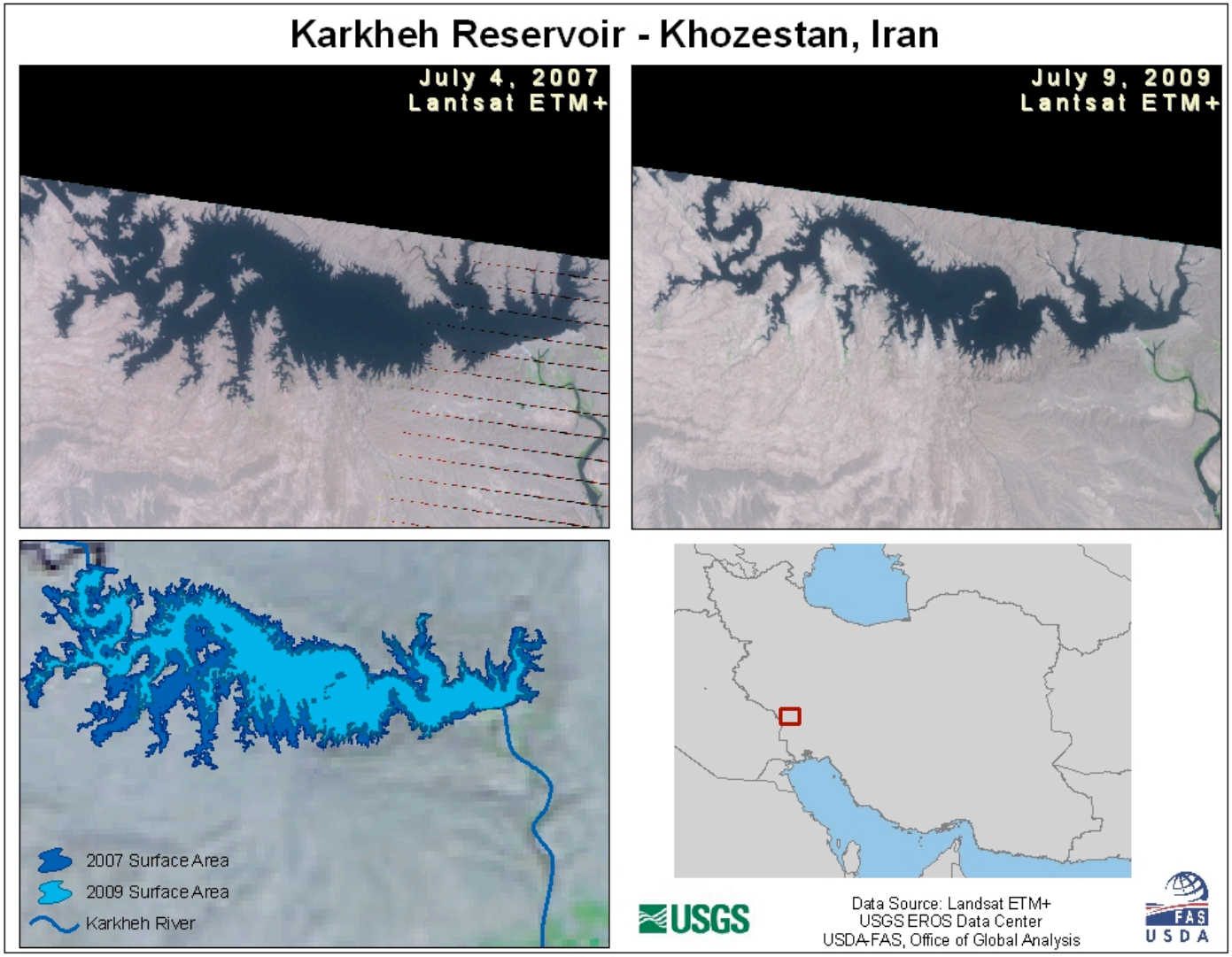
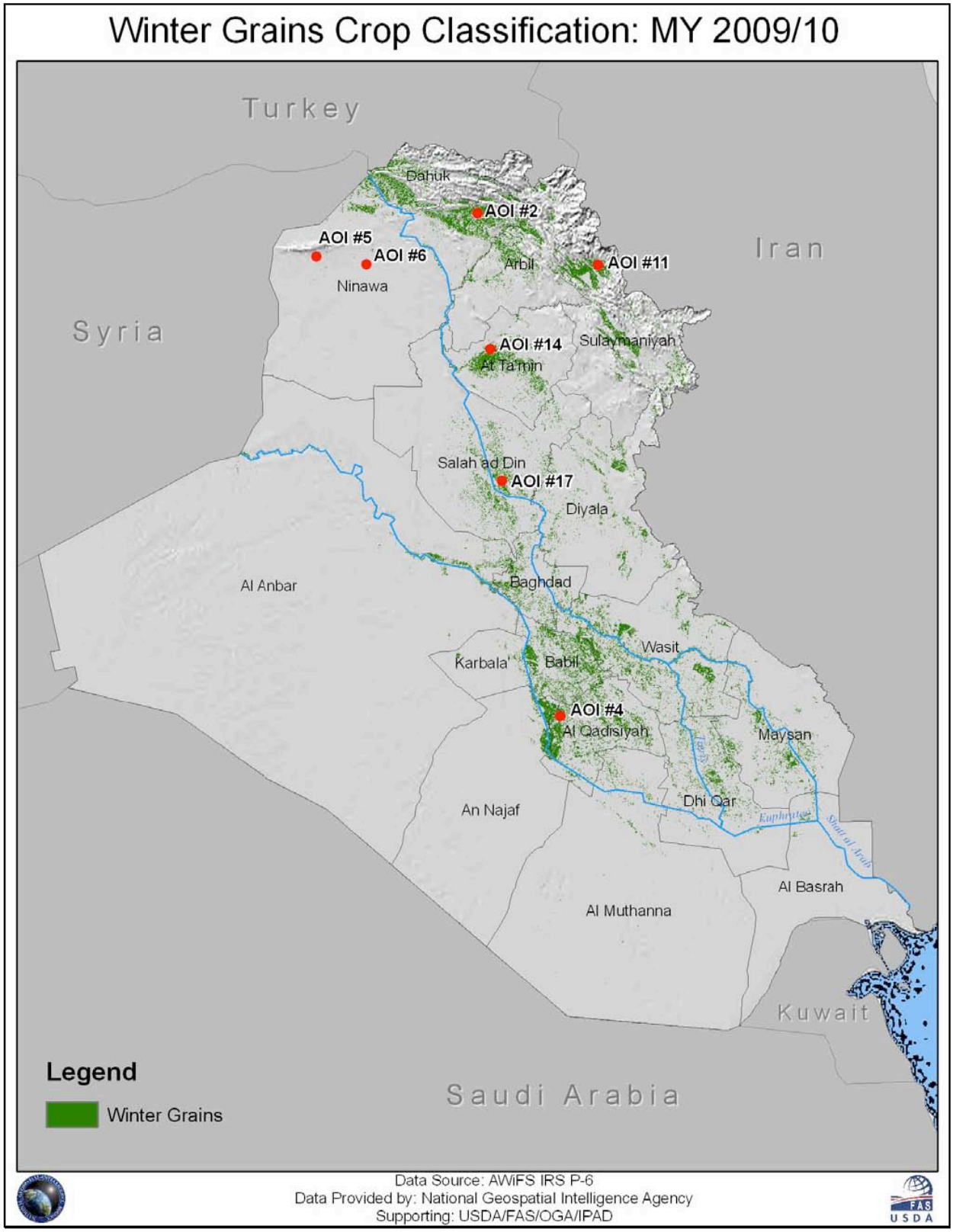


Figure 25. Dramatic water loss in the Karkheh Reservoir located in Khozestan province, western Iran. After two years of sustained drought and continued water use of the Karkheh River for summer and winter crop irrigation the reservoir surface area has dropped over 43%.



Winter grains map classified from AWiFS imagery. AOIs show locations of high resolution Quickbird imagery.

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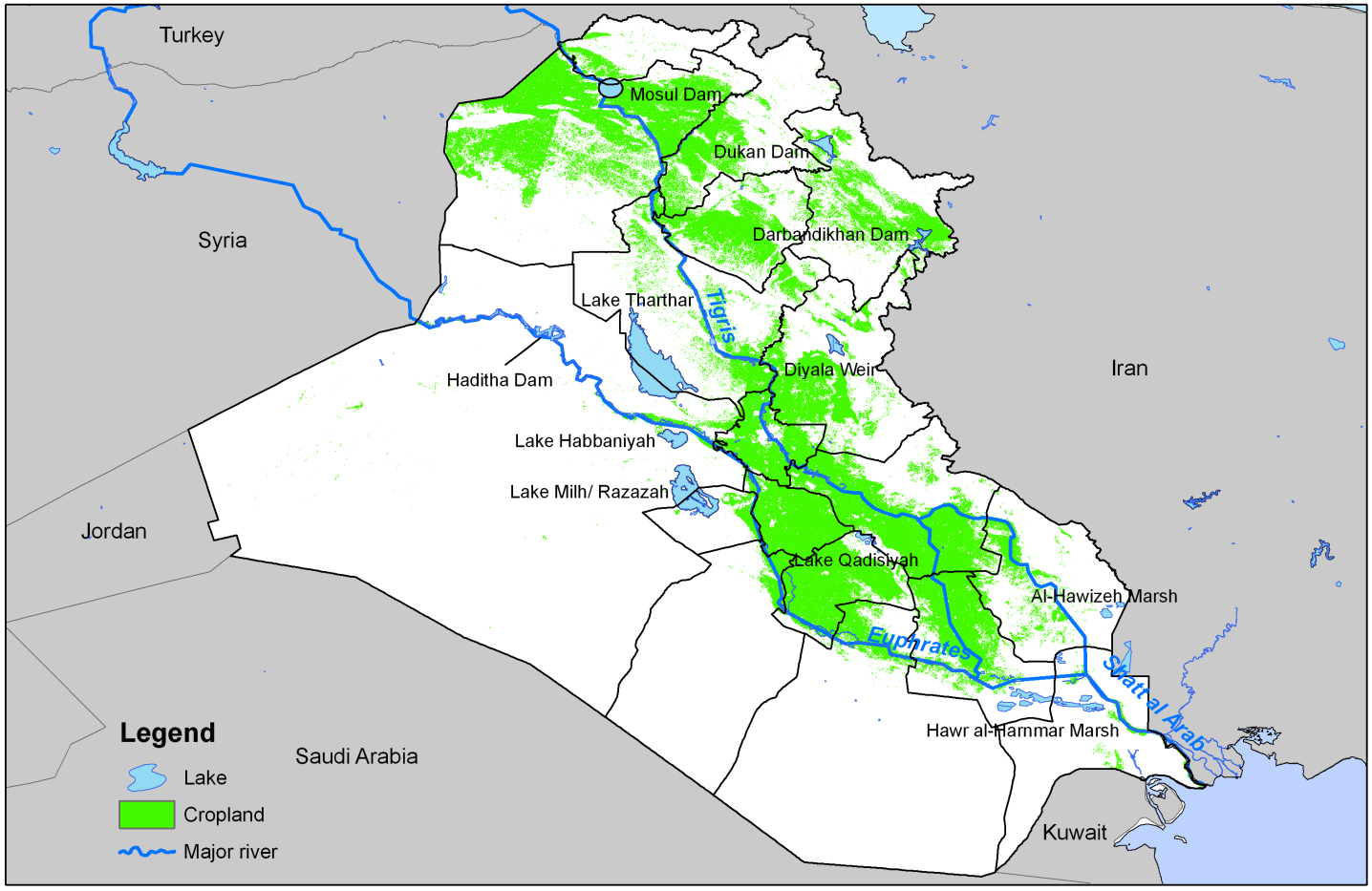
Aboveground water resources in Iraq



Data analysis by USDA/FAS/OGA/IPAD and ASRC Manegement Services

Major lakes and reservoirs in Iraq.

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For more information contact:
Michael Shean | michael.shean@fas.usda.gov | (202) 720-7366 USDA-FAS, OGA or
Guy Serbin | guy.serbin@asrcms.com | (202) 720-0143 ASRC Management Services.